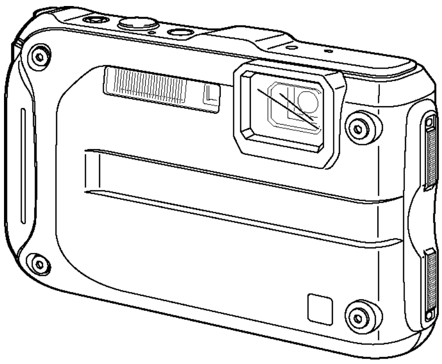
ORDER NO.DSC1203010CE
B26

Service Manual

Digital Camera

Model No. **DMC-FT4EB**
DMC-FT4EE
DMC-FT4EF
DMC-FT4EG
DMC-FT4EP
DMC-FT4GC
DMC-FT4GN
DMC-TS4P
DMC-TS4PC
DMC-TS4PU
DMC-TS4GH
DMC-TS4GD



Colours
(A)....................Blue Type (Except DMC-FT4EE/EF)
(D)....................Orange Type
(S)....................Silver Type (Except DMC-FT4EF, DMC-TS4GD/PC)
(K)....................Black Type (Except DMC-FT4EE, DMC-TS4GD/GH)

⚠ WARNING

This service information is designed for experienced repair technicians only and is not designed for use by the general public.
It does not contain warnings or cautions to advise non-technical individuals of potential dangers in attempting to service a product.
Products powered by electricity should be serviced or repaired only by experienced professional technicians. Any attempt to service or repair the product or products dealt with in this service information by anyone else could result in serious injury or death.

Panasonic®

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1 Safety Precautions

1.1. General Guidelines

1. IMPORTANT SAFETY NOTICE
   There are special components used in this equipment which are important for safety. These parts are marked by ⚠ in the Schematic Diagrams, Circuit Board Layout, Exploded Views and Replacement Parts List. It is essential that these critical parts should be replaced with manufacturer's specified parts to prevent X-RADIATION, shock fire, or other hazards. Do not modify the original design without permission of manufacturer.
2. An Isolation Transformer should always be used during the servicing of AC Adaptor whose chassis is not isolated from the AC power line. Use a transformer of adequate power rating as this protects the technician from accidents resulting in personal injury from electrical shocks. It will also protect AC Adaptor from being damaged by accidental shorting that may occur during servicing.
3. When servicing, observe the original lead dress. It a short circuit is found, replace all parts which have been overheated or damaged by the short circuit.
4. After servicing, see to it that all the protective devices such as insulation barriers, insulation papers shields are properly installed.
5. After servicing, make the following leakage current checks to prevent the customer from being exposed to shock hazards.

1.2. Leakage Current Cold Check

1. Unplug the AC cord and connect a jumper between the two prongs on the plug.
2. Measure the resistance value, with an ohmmeter, between the jumpered AC plug and each exposed metallic cabinet part on the equipment such as screwheads, connectors, control shafts, etc. When the exposed metallic part has a return path to the chassis, the reading should be between 1MΩ and 5.2MΩ. When the exposed metal does not have a return path to the chassis, the reading must be infinity.

1.3. Leakage Current Hot Check (See Figure 1)

1. Plug the AC cord directly into the AC outlet. Do not use an isolation transformer for this check.
2. Connect a 1.5kΩ, 10 W resistor, in parallel with a 0.15μF capacitor, between each exposed metallic part on the set and a good earth ground, as shown in Figure 1.
3. Use an AC voltmeter, with 1 kΩ/V or more sensitivity, to measure the potential across the resistor.
4. Check each exposed metallic part, and measure the voltage at each point.
5. Reverse the AC plug in the AC outlet and repeat each of the above measurements.
6. The potential at any point should not exceed 0.75 V RMS. A leakage current tester (Simpson Model 229 or equivalent) may be used to make the hot checks, leakage current must not exceed 1/2 mA. In case a measurement is outside of the limits specified, there is a possibility of a shock hazard, and the equipment should be repaired and rechecked before it is returned to the customer.

Hot-Check Circuit

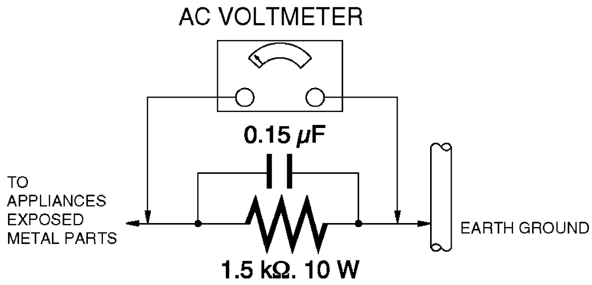


Figure 1

1.4. How to Discharge the Capacitor on Flash CON P.C.B.

• This unit equipped with two pieces of capacitors as flash charging capacitors.
"Either one of the capacitor discharging operation" makes discharging for others as well.

CAUTION:

1. **Be sure to discharge the capacitor on Flash CON P.C.B.**
2. **Be careful of the high voltage circuit on Flash CON P.C.B. when servicing.**

[Discharging Procedure]

1. Refer to the disassemble procedure and remove the necessary parts/unit.
2. Put the insulation tube onto the lead part of Resistor (ERG5SJ102:1kΩ /5W).
   (An equivalent type of resistor may be used.)
3. Put the resistor between both terminals of capacitor on Flash CON P.C.B. for approx. 5 seconds.
4. After discharging confirm that the capacitor voltage is lower than 10V using a voltmeter.

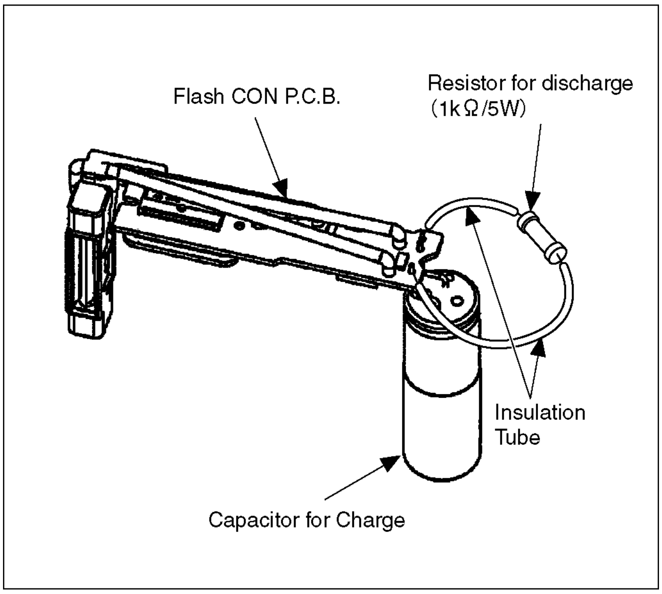


Fig. F1

2 Warning

2.1. Prevention of Electrostatic Discharge (ESD) to Electrostatic Sensitive (ES) Devices

Some semiconductor (solid state) devices can be damaged easily by static electricity. Such components commonly are called Electrostatically Sensitive (ES) Devices.

Examples of typical ES devices are CCD image sensor, IC (integrated circuits) and some field-effect transistors and semiconductor “chip” components.

The following techniques should be used to help reduce the incidence of component damage caused by electrostatic discharge (ESD).

1. Immediately before handling any semiconductor component or semiconductor-equipped assembly, drain off any ESD on your body by touching a known earth ground. Alternatively, obtain and wear a commercially available discharging ESD wrist strap, which should be removed for potential shock reasons prior to applying power to the unit under test.
2. After removing an electrical assembly equipped with ES devices, place the assembly on a conductive surface such as aluminum foil, to prevent electrostatic charge buildup or exposure of the assembly.
3. Use only a grounded-tip soldering iron to solder or unsolder ES devices.
4. Use only an antistatic solder removal device. Some solder removal devices not classified as antistatic (ESD protected) can generate electrical charge sufficient to damage ES devices.
5. Do not use freon-propelled chemicals. These can generate electrical charges sufficient to damage ES devices.
6. Do not remove a replacement ES device from its protective package until immediately before you are ready to install it. (Most replacement ES devices are packaged with leads electrically shorted together by conductive foam, aluminum foil or comparable conductive material).
7. Immediately before removing the protective material from the leads of a replacement ES device, touch the protective material to the chassis or circuit assembly into which the device will be installed.
   CAUTION:
   Be sure no power is applied to the chassis or circuit, and observe all other safety precautions.
8. Minimize bodily motions when handling unpackaged replacement ES devices. (Otherwise harmless motion such as the brushing together of your clothes fabric or the lifting of your foot from a carpeted floor can generate static electricity (ESD) sufficient to damage an ES device).

2.2. How to Recycle the Lithium Ion Battery (U.S. Only)

ENGLISH	A lithium ion/polymer battery that is recyclable powers the product you have purchased. Please call 1-800-8-BATTERY for information on how to recycle this battery.
FRANÇAIS	L'appareil que vous vous êtes procuré est alimenté par une batterie au lithium-ion/polymère recyclable. Pour des renseignements sur le recyclage de la batterie, veuillez composer le 1-800-8-BATTERY.

2.3. Caution for AC Cord (For EB/GC/GH)

2.3.1. Information for Your Safety

IMPORTANT

Your attention is drawn to the fact that recording of pre-recorded tapes or discs or other published or broadcast material may infringe copyright laws.

WARNING

To reduce the risk of fire or shock hazard, do not expose this equipment to rain or moisture.

CAUTION

To reduce the risk of fire or shock hazard and annoying interference, use the recommended accessories only.

FOR YOUR SAFETY

DO NOT REMOVE THE OUTER COVER

To prevent electric shock, do not remove the cover. No user serviceable parts inside. Refer servicing to qualified service personnel.

2.3.2. Caution for AC Mains Lead

For your safety, please read the following text carefully.

This appliance is supplied with a moulded three-pin mains plug for your safety and convenience.
A 5-ampere fuse is fitted in this plug.
Should the fuse need to be replaced please ensure that the replacement fuse has a rating of 5 amperes and it is approved by ASTA or BSI to BS1362
Check for the ASRA mark or the BSI mark on the body of the fuse.

ASTA mark	BSI mark

If the plug contains a removable fuse cover you must ensure that it is refitted when the fuse is replaced.
If you lose the fuse cover, the plug must not be used until a replacement cover is obtained.
A replacement fuse cover can be purchased from your local Panasonic Dealer.

If the fitted moulded plug is unsuitable for the socket outlet in your home then the fuse should be removed and the plug cut off and disposed of safety.
There is a danger of severe electrical shock if the cut off plug is inserted into any 13-ampere socket.

If a new plug is to be fitted please observe the wiring code as shown below.
If in any doubt, please consult a qualified electrician.

2.3.2.1. Important

The wires in this mains lead are coloured in accordance with the following code:

Blue	Neutral
Brown	Live

As the colours of the wires in the mains lead of this appliance may not correspond with the coloured markings identifying the terminals in your plug, proceed as follows:

The wire which is coloured BLUE must be connected to the terminal in the plug which is marked with the letter N or coloured BLACK.

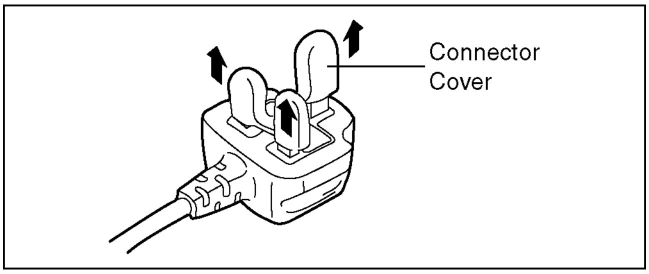
The wire which is coloured BROWN must be connected to the terminal in the plug which is marked with the letter L or coloured RED.

Under no circumstances should either of these wires be connected to the earth terminal of the three pin plug, marked with the letter E or the Earth Symbol.

Earth Symbol	⏚

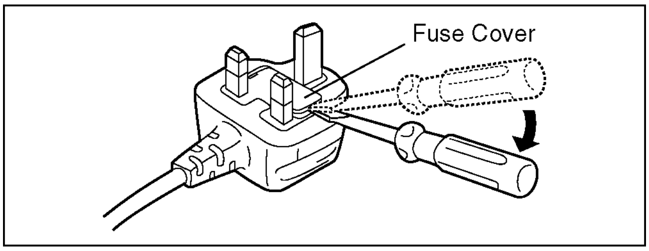
2.3.2.2. Before Use

remove the Connector Cover as follows.

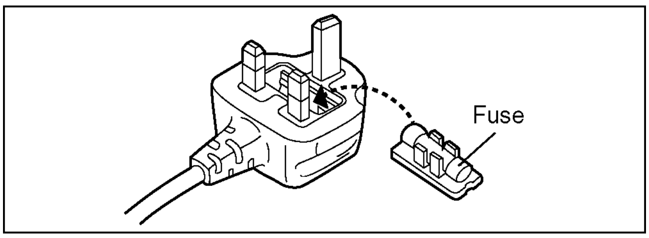


2.3.2.3. How to Replace the Fuse

1. Remove the Fuse Cover with a screwdriver.



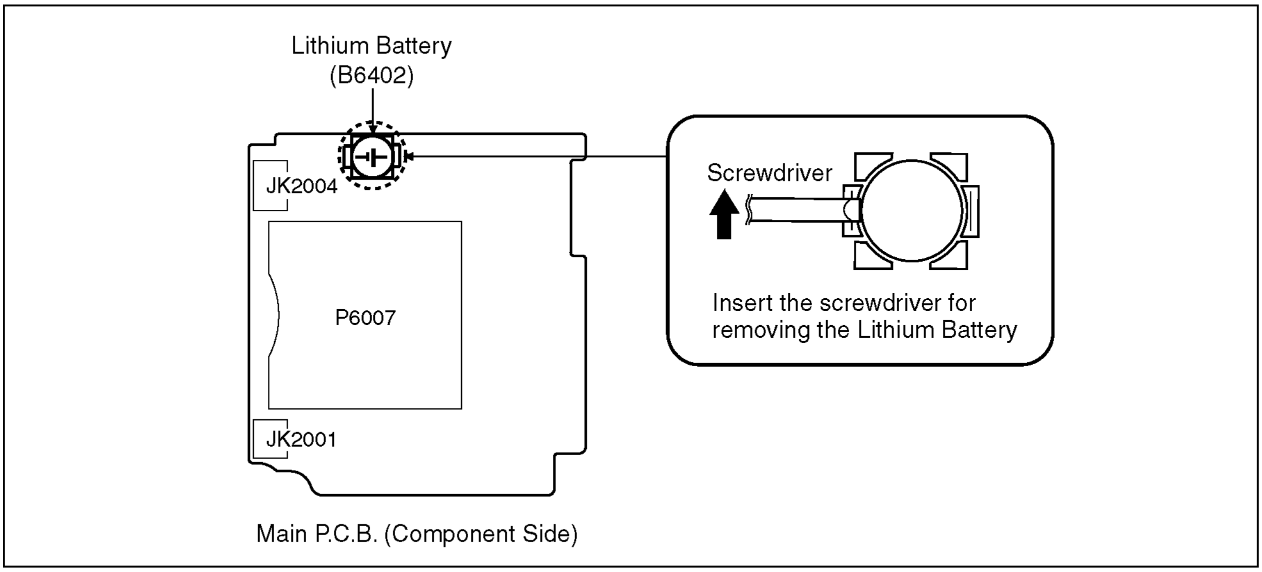
2. Replace the fuse and attach the Fuse cover.



2.4. How to Replace the Lithium Battery

2.4.1. Replacement Procedure

1. Remove the Main P.C.B. (Refer to Disassembly Procedures.)
2. Remove the Lithium battery (Ref. No. B6402 at foil side of Main P.C.B.) and then replace it into new one.



CAUTION
Danger of explosion if battery is incorrectly replaced.
Replace only with the same or equivalent type.

CAUTION
The battery used in this device may present a risk of fire or chemical burn if mistreated.
Do not recharge, disassemble, heat above 100 °C (212 °F), or incinerate.
Replace battery with Panasonic part number ML-421S/ZTK only.
Use of another battery may present a risk of fire or explosion.
Dispose of used battery promptly.
Keep away from children.
Do not disassemble and do not dispose of in fire.

Note:

The lithium battery is a critical component.
(Type No.: ML-421S/ZTK **Manufactured by Energy Company, Panasonic Corporation**)
It must never be subjected to excessive heat or discharge.
It must therefore only be fitted in equipment designed specifically for its use.
Replacement batteries must be of the same type and manufacture.
They must be fitted in the same manner and location as the original battery, with the correct polarity contacts observed.
Do not attempt to re-charge the old battery or re-use it for any other purpose.
It should be disposed of in waste products destined for burial rather than incineration.

(For English)

CAUTION

Danger of explosion if battery is incorrectly replaced.
Replace only with the same or equivalent type recommended by the manufacturer.
Dispose of used batteries according to the manufacturer’s instructions.

(For German)

ACHTUNG

Explosionsgefahr bei falschem Anbringen der Batterie. Ersetzen Sie nur mit einem äquivalentem vom Hersteller empfohlenem Typ.
Behandeln Sie gebrauchte Batterien nach den Anweisungen des Herstellers.

(For French)

MISE EN GARDE

Une batterie de remplacement inappropriée peut exploser. Ne remplacez qu’avec une batterie identique ou d’un type recommandé par le fabricant. L’élimination des batteries usées doit être faite conformément aux instructions du manufacturier.

Note:

Above caution is applicable for a battery pack which is for DMC-FT4 and DMC-TS4 series, as well.
Danger of explosion if battery is incorrectly replaced.
Replace only with the same or equivalent type recommended by the manufacturer.
Dispose of used batteries according to the manufacturer's instructions.

3 Service Navigation

3.1. Introduction

This service manual contains technical information, which will allow service personnel's to understand and service this model.
Please place orders using the parts list and not the drawing reference numbers.
If the circuit is changed or modified, the information will be followed by service manual to be controlled with original service manual.

3.2. Air-leak test (inspection)

Waterproof/Dustproof Performance This camera's waterproof/dustproof rating complies with the "IPX8" and "IP6X" ratings. Provided the care and maintenance guidelines described in this document are strictly followed, this camera can operate underwater, to a depth not exceeding 12 m (40 feet) for a time not exceeding 60 minutes. (*1) Anti-shock Performance This camera also complies with "MIL-STD 810F Method 516.5-Shock". The camera has cleared a drop test from a height of 2 m (6.6 feet) onto 3 cm (0.10 feet) thick plywood. In most cases this camera should not sustain any damage if dropped from a height not exceeding 2 m (6.6 feet). (*2)

This does not guarantee no destruction, no malfunction, or waterproofing in all conditions.

*1 This means that the camera can be used underwater for specified time in specified pressure in accordance with the handling method established by Panasonic.

*2 "MIL-STD 810F Method 516.5-Shock" is the test method standard of the U.S. Defense Department, which specifies performing drop tests from a height of 122 cm (4.0 feet), at 26 orientations (8 corners, 12 ridges, 6 faces) using 5 sets of devices, and passing the 26 orientation drops within 5 devices. (If failure occurs during the test, a new set is used to pass the drop orientation test within a total of 5 devices)
Panasonic’s test method is based on the above "MIL-STD 810F Method 516.5-Shock". However, the drop height was changed from 122 cm (4.0 feet) to 200 cm (6.6 feet) dropping onto 3 cm (0.10 feet) thick plyboard. This drop test was passed. (Disregarding appearance change such as loss of paint or distortion of the part where drop impact is applied.)

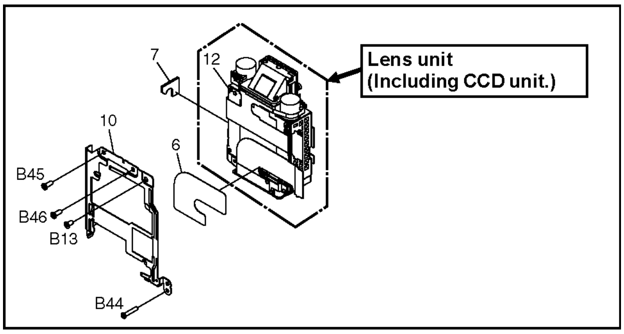
- Due to the above characteristics of the products, perform the air-leak test (inspection) using Air -leak tester (Part No.:RFKZ0528) before/after servicing including assembly and/or assembly process.
  Note:
  The purpose of the air-leak test before servicing is that whether the malfunction occurred due to air-leak or not.
- When servicing, refer to the "7.Troubleshooting Guide" section for details.

3.3. Replacing the waterproof packing (waterproof seal)

- The integrity of the waterproof packing may decrease about 1 year, with use and age.
  (We recommend end users to replace the waterproof packing (waterproof seal) at least once each year described in the operating instructions.)
- As for replacement procedure, refer to the 7.1.2. Periodical maintenance (Packing replacement) flow for details.

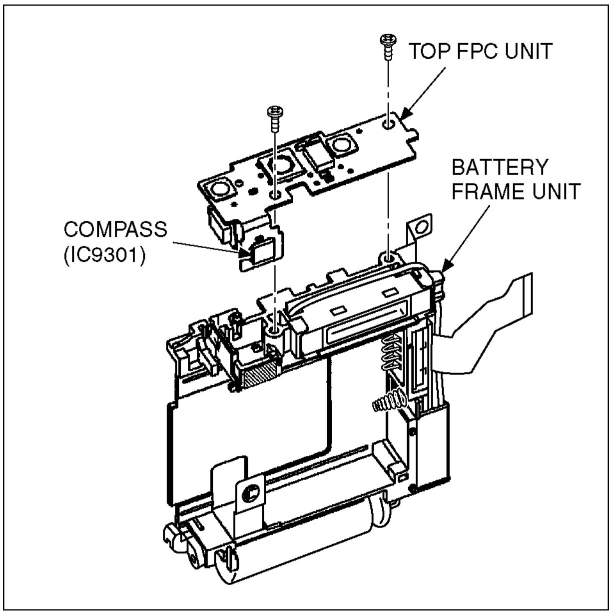
3.4. Lens Unit

- Since the lens unit for this model is assembled with high accuracy manufacturing technologies, it is not allowed to disassemble/ assemble the lens unit, in terms of performance retention.
  When servicing, it has to be handled the "Lens with CCD unit" as the smallest part size.
  Confirm the replacement part list and exploded views for details.



3.5. About IC9301 (COMPASS) [On the TOP FPC UNIT]

When IC9301 is defects and necessary to be replaced, replace with whole TOP FPC UNIT as a unit.



3.6. General Description About Lead Free Solder (PbF)

The lead free solder has been used in the mounting process of all electrical components on the printed circuit boards used for this equipment in considering the globally environmental conservation.
The normal solder is the alloy of tin (Sn) and lead (Pb). On the other hand, the lead free solder is the alloy mainly consists of tin (Sn), silver (Ag) and Copper (Cu), and the melting point of the lead free solder is higher approx.30 °C (86 °F) more than that of the normal solder.

Definition of P.C.B. Lead Free Solder being used

The letter of PbF is printed either foil side or components side on the P.C.B. using the lead free solder. (See right figure)	PbF

Service caution for repair work using Lead Free Solder (PbF)

- The lead free solder has to be used when repairing the equipment for which the lead free solder is used.
- (Definition: The letter of PbF is printed on the P.C.B. using the lead free solder.)
- To put lead free solder, it should be well molten and mixed with the original lead free solder.
- Remove the remaining lead free solder on the P.C.B. cleanly for soldering of the new IC.
- Since the melting point of the lead free solder is higher than that of the normal lead solder, it takes the longer time to melt the lead free solder.
- Use the soldering iron (more than 70W) equipped with the temperature control after setting the temperature at 350±30 degrees C (662±86 °F).

Recommended Lead Free Solder (Service Parts Route.)

- The following 3 types of lead free solder are available through the service parts route.
  RFKZ03D01KS-----------(0.3mm 100g Reel)
  RFKZ06D01KS-----------(0.6mm 100g Reel)
  RFKZ10D01KS-----------(1.0mm 100g Reel)

Note

* Ingredient: tin (Sn) 96.5%, silver (Ag) 3.0%, Copper (Cu) 0.5%, Cobalt (Co) / Germanium (Ge) 0.1 to 0.3%

3.7. How to Define the Model Suffix (NTSC or PAL model)

There are seven kinds of DMC-FT4/TS4, regardless of the colours.

- a) DMC-FT4 (Japan domestic model.)
- b) DMC-TS4P/PC
- c) DMC-FT4EB/EF/EG/EP
- d) DMC-FT4EE
- e) DMC-FT4GN
- f) DMC-TS4GD
- g) DMC-FT4GC, DMC-TS4GH/PU

What is the difference is that the "INITIAL SETTINGS" data which is stored in Flash ROM mounted on Main P.C.B.

3.7.1. Defining methods

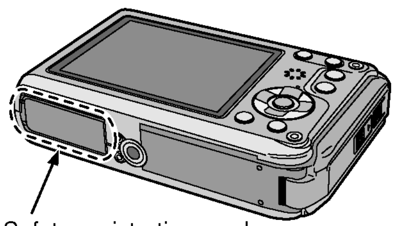
To define the model suffix to be serviced, refer to the nameplate which is putted on the bottom side of the Unit.

a) DMC-FT4 (Japan domestic model)

The nameplate for this model shows the following Safety registration mark.

b) DMC-TS4P/PC

The nameplate for these models show the following Safety registration mark.



c) DMC-FT4EB/EF/EG/EP

The nameplate for these models show the following Safety registration mark.

d) DMC-FT4EE

The nameplate for this model show the following Safety registration mark.

e) DMC-FT4GN

The nameplate for this model show the following Safety registration mark.

f) DMC-TS4GD

The nameplate for this model show the following Safety registration mark.

g) DMC-FT4GC, DMC-TS4GH/PU

The nameplate for these models do not show any above safety registration mark.

Note:

After replacing the Main P.C.B., be sure to achieve adjustment.

The Maintenance software (DIAS) is available at "software download" on the "Support Information from NWBG/VDBG-AVC" web-site in "TSN system".

3.7.2. INITIAL SETTINGS:

After replacing the Main P.C.B., be sure to perform the initial settings after achieving the adjustment by ordering the following procedure in accordance with model suffix of the unit.

1. IMPORTANT NOTICE:

Before proceeding Initial settings, be sure to read the following CAUTIONS.

CAUTION 1:(INITIAL SETTINGS)

---AFTER REPLACING THE MAIN P.C.B. ---

[Other than "EG, EF, EB and EP" models : (VEP56129C is used as a Main P.C.B.)]

*.The model suffix can be chosen **JUST ONE TIME.**

(Effective model suffix : DMC-FT4 " EE/GC/GN")

DMC-TS4 " GH/GD/P/PC/PU")

*.Once one of the model suffix has been chosen, the model suffix lists will not be displayed, thus, it can not be changed.

[Only for "EG, EF, EB and EP" models : (VEP56129D is used as a Main P.C.B.)]

*.From the beginning, only "EG, EF, EB, and EP" are displayed as a model suffix lists, and these are displayed from the second times as well.

CAUTION 2:(Stored picture image data in the unit)

This unit employs "Built-in Memory" for picture image data recording.(Approx.20MB)

After proceeding "INITIAL SETTINGS", the picture image data stored in the unit is erased.

2. PROCEDURES:

- Precautions: Read the above "CAUTION 1" and "CAUTION 2", carefully
- Preparation:
  1. Attach the Battery to the unit.
  2. Set to P(Program AE) mode by operating the mode button.

Note:

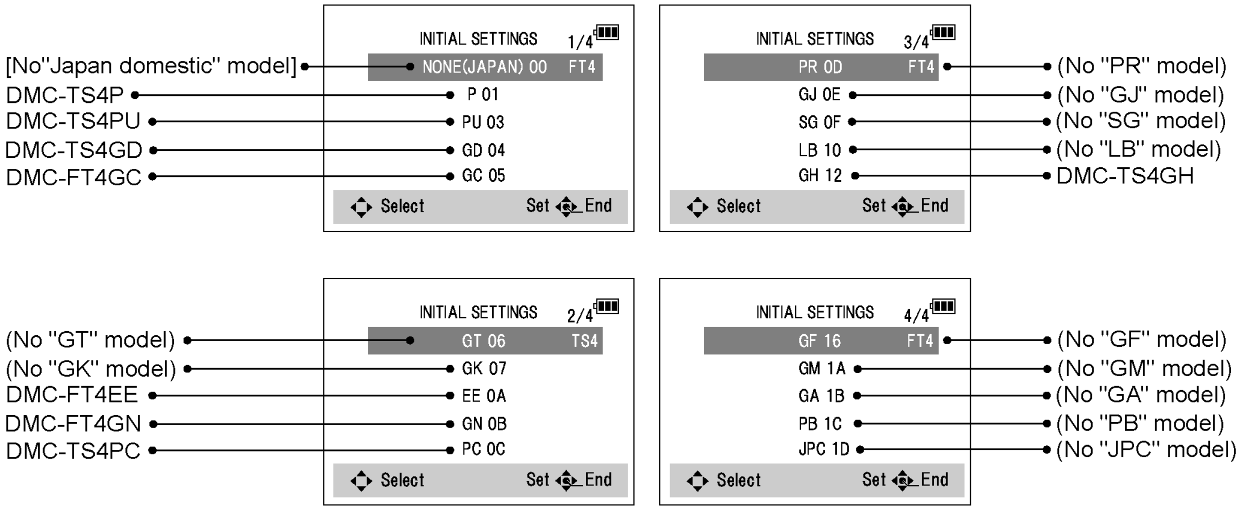
If the picture mode is other than P(Program AE) mode, it does not display the initial settings menu.

- **Step 1. The temporary cancellation of "INITIAL SETTINGS":**
  While keep pressing "UP of Cursor button" and MOTION PICTURE button simultaneously, turn the Power on.
- **Step 2. The cancellation of "INITIAL SETTINGS":**
  Press the PLAYBACK button.
  Press "UP of Cursor button" and MOTION PICTURE button simultaneously, then turn the Power off.
- **Step 3. Turn the Power on:**
  Turn the Power on.
- **Step 4. Display the "INITIAL SETTINGS" menu:**
  While keep pressing MENU/SET and "RIGHT of Cursor button" simultaneously, turn the Power off.
  The "INITIAL SETTINGS" menu is displayed.
  There are two kinds of "INITIAL SETTINGS" menu form as follows:

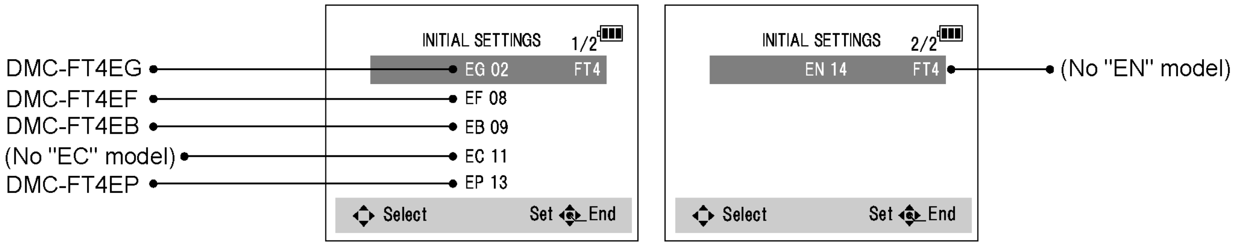
  [CASE 1. After replacing Main P.C.B.]

  [Except "EG, EF, EB and EP" models : (VEP56129C is used as a Main P.C.B.)]

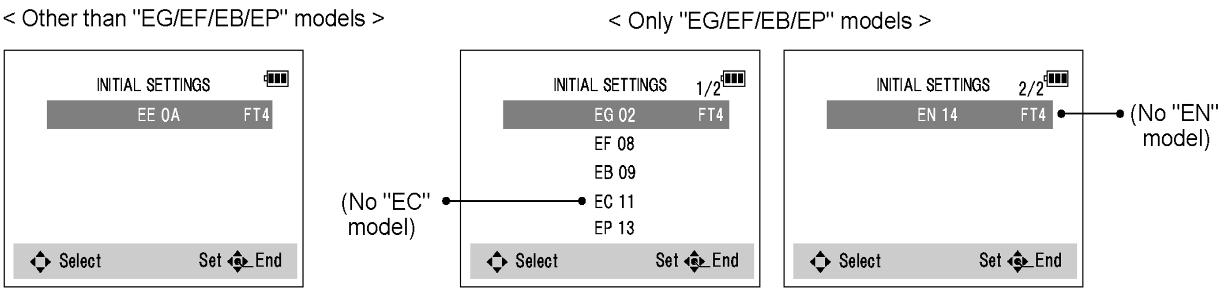
  When Main P.C.B. has just been replaced, the following model suffix list is displayed as follows. (Four pages in total)



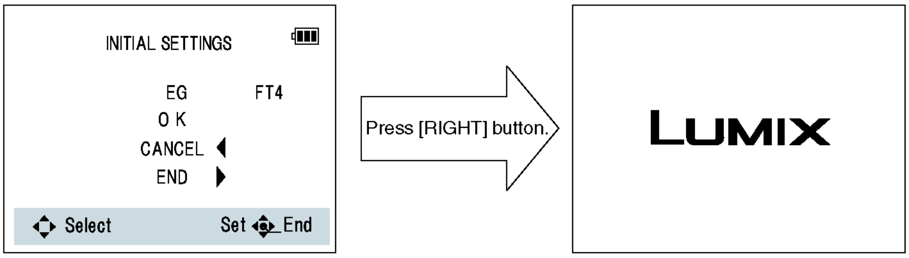
[Only for "EG, EF, EB and EP" models : (VEP56129D is used as a Main P.C.B.)]
When Main P.C.B. has just been replaced, the following model suffix list is displayed as follows. (Two pages in total)



[CASE 2. Other than "After replacing Main P.C.B."]



- **Step 5. Choose the model suffix in "INITIAL SETTINGS": (Refer to "CAUTION 1")**
  [Caution: After replacing Main P.C.B.]
  (Especially, other than "EG, EF, EB and EP" models : (VEP56129D is used as a Main P.C.B.))
  The model suffix can be chosen, JUST ONE TIME.
  Once one of the model suffix have been chosen, the model suffix lists will not be displayed, thus, it can be changed.
  Therefore, select the area carefully.
  Select the area with pressing "UP / DOWN of Cursor buttons".
- **Step 6. Set the model suffix at "INITIAL SETTINGS":**
  Press the "RIGHT of Cursor buttons".
  The only set area is displayed. Press the "RIGHT of Cursor buttons" after confirmation.
  (The unit is powered off automatically.)



• **Step 7. CONFIRMATION:**
Confirm the display of "PLEASE SET THE CLOCK" in concerned language when the unit is turned on again.
When the unit is connected to PC with USB cable, it is detected as removable media.
1) As for your reference, major default setting condition is as shown in the following table.
Default setting (After "INITIAL SETTINGS")

	MODEL	VIDEO OUTPUT	LANGUAGE	DATE	REMARKS
a)	DMC-FT4(Japan domestic model)	NTSC	Japanese	Year/Month/Date	
b)	DMC-FT4EB	PAL	English	Date/Month/Year	
c)	DMC-FT4EE	PAL	Russian	Date/Month/Year	
d)	DMC-FT4EF	PAL	French	Date/Month/Year	
e)	DMC-FT4EG	PAL	English	Date/Month/Year	
f)	DMC-FT4EP	PAL	English	Date/Month/Year	
g)	DMC-FT4GC	PAL	English	Date/Month/Year	
h)	DMC-FT4GN	PAL	English	Date/Month/Year	
i)	DMC-TS4GH	PAL	English	Date/Month/Year	
j)	DMC-TS4GD	NTSC	Korean	Year/Month/Date	
k)	DMC-TS4P	NTSC	English	Date/Month/Year	
l)	DMC-TS4PC	NTSC	English	Date/Month/Year	
m)	DMC-TS4PU	NTSC	Spanish	Date/Month/Year	

4 Specifications

Digital Camera:
Information for your safety

Power Source:	DC 5.1 V
Power Consumption:	1.4 W (When recording) 0.7 W (When playing back)

Camera effective pixels	12,100,000 pixels	
Image sensor	1/2.33″ CCD, total pixel number 12,500,000 pixels, Primary color filter	
Lens	Optical 4.6× zoom, f=4.9 mm to 22.8 mm (35 mm film camera equivalent: 28 mm to 128 mm)/F3.3 (Wide) to F5.9 (Tele)	
Image stabilizer	Optical method	
Focus range	Normal	30 cm (0.98 feet) to ∞
	Macro/ Intelligent auto/ Motion Picture	5 cm (0.16 feet) (Wide)/30 cm (0.98 feet) (Tele) to ∞
	Scene Mode	There may be differences in the above settings.
Shutter system	Electronic shutter+Mechanical shutter	
Minimum Illumination	Approx. 12 lx (when i-low light is used, the shutter speed is 1/30th of a second)	
Shutter speed	60 seconds to 1/1300th of a second	
Exposure	Program AE (P)/Manual Exposure (M)	
Metering mode	Multiple	
LCD monitor	2.7″ TFT LCD (4:3) (Approx. 230,000 dots) (field of view ratio about 100%)	
Microphone	Monaural	
Speaker	Monaural	
Recording media	Built-in Memory (Approx. 20 MB)/SD Memory Card/ SDHC Memory Card/SDXC Memory Card	
Recording file format		
Still Picture	JPEG (based on “Design rule for Camera File system”, based on “Exif 2.3” standard, DPOF corresponding)/MPO	
Motion pictures	AVCHD/MP4	
Audio compression format	AVCHD: Dolby Digital MP4: AAC	
Interface		
Digital	“USB 2.0” (High Speed)	
Analog video	NTSC	
Audio	Audio line output (monaural)	
Terminal		
[AV OUT/DIGITAL]	Dedicated jack (8 pin)	
[HDMI]	MicroHDMI TypeD	
Dimensions (excluding the projecting parts)	Approx. 103.5 mm (W)×64 mm (H)×26.5 mm (D) [4.07″(W)×2.52″(H)×1.04″(D)]	
Mass (weight)	Approx. 197 g/0.434 lb (with card and battery) Approx. 175 g/0.386 lb (excluding card and battery)	
Operating temperature	−10 °C* to 40 °C (14 °F* to 104 °F) * The performance of the battery (number of recordable pictures/operating time) may decrease temporarily when using in a temperature between −10 °C and 0 °C (14 °F and 32 °F) (cold places such as ski resorts or places at high altitude).	
Operating humidity	10%RH to 80%RH	
Bearing sensor	8 bearing detection (with angular position correction function by the 3 axes acceleration sensor, with automatic declination correction, and with automatic offset adjustment function)	
Atmospheric pressure/altitude sensor		
Atmospheric pressure	Measurement range 300 hPa to 1100 hPa, with 24 hour memory function in 1 hPa unit (every 1.5 hours)	
Altitude	Convert atmospheric pressure to altitude using ISA [International Standard Atmosphere], accuracy: −5 m (–16 feet) to +5 m (16 feet)	
Depth	Displays in 3 levels [displays 0 m (0 feet) to 12 m (40 feet) in 3 levels]	

GPS	Reception frequency: 1575.42 MHz (C/A code) Geographical coordinate system: WGS84
Waterproof performance	Equivalent to IEC 60529 “IPX8”. [Usable for 60 minutes in 12 m (40 feet) water depth]
Crash resistance perfomance	The test method of the camera is in compliance with “MIL-STD 810F Method 516.5-Shock”*. * “MIL-STD 810F Method 516.5-Shock” is the test method standard of the U.S. Defense Department, which specifies performing drop tests from a height of 122 cm (4 feet), at 26 orientations (8 corners, 12 ridges, 6 faces) using 5 sets of devices, and passing the 26 orientation drops within 5 devices. (If failure occurs during the test, a new set is used to pass the drop orientation test within a total of 5 devices) • Panasonic’s test method is based on the above “MIL-STD 810F Method 516.5-Shock”. However, the drop height was changed from 122 cm (4 feet) to 200 cm (6.6 feet) dropping onto 3 cm (0.1 feet) thick plyboard. This drop test was passed. (Disregarding appearance change such as loss of paint or distortion of the part where drop impact is applied.) **There is no guarantee of not breaking or malfunctioning under all conditions.**
Dustproof performance	Equivalent to IEC 60529 “IP6X”.

Battery Charger (Panasonic DE-A59B):
Information for your safety

Input:	110 V to 240 V ~ 50/60 Hz, 0.2 A
Output:	4.2 V ⎓ 0.65 A
Operating temperature:	0 °C* to 40 °C (32 °F* to 104 °F) * The battery cannot be recharged in a temperature less than 0 °C (32 °F). (The [CHARGE] indicator blinks when the battery cannot be recharged.)

Equipment mobility:
Movable

Battery Pack (lithium-ion) (Panasonic DMW-BCF10PP):
Information for your safety

Voltage/capacity:	3.6 V/940 mAh

Note:

*Above specification is for DMC-TS4P. Some of the specification may differ depends on model suffix.

[1] Only for "EB/EF/EG/EP" models:

1). [Interface Digital:]

• Data from the PC can not be written to the camera using the USB connection cable.

[2] Others:

1). [Analog video/audio:]

NTSC ---(Only "P/PC/PU/GD" models)

NTSC/PAL Composite (Switched by menu) ----------(Except "P/PC/PU/GD" models)

2). [Motion pictures:]

• Maximum time to record motion pictures continuously with [GFS]/[FSH] in [AVCHD] is 29 minutes 59 seconds.

(Important) About the Waterproof/Dustproof and Anti-shock Performance of the Camera

Waterproof/Dustproof Performance

This camera's waterproof/dustproof rating complies with the "IPX8" and "IP6X" ratings. Provided the care and maintenance guidelines described in this document are strictly followed, this camera can operate underwater, to a depth not exceeding 12 m (40 feet) for a time not exceeding 60 minutes. (∗1)

Anti-shock Performance

This camera also complies with "MIL-STD 810F Method 516.5-Shock". The camera has cleared a drop test from a height of 2 m (6.6 feet) onto 3 cm (0.1 feet) thick plywood. In most cases this camera should not sustain any damage if dropped from a height not exceeding 2 m (6.6 feet). (∗2)

This does not guarantee no destruction, no malfunction, or waterproofing in all conditions.

∗1 This means that the camera can be used underwater for specified time in specified pressure in accordance with the handling method established by Panasonic.

∗2 "MIL-STD 810F Method 516.5-Shock" is the test method standard of the U.S. Defense Department, which specifies performing drop tests from a height of 122 cm (4 feet), at 26 orientations (8 corners, 12 ridges, 6 faces) using 5 sets of devices, and passing the 26 orientation drops within 5 devices. (If failure occurs during the test, a new set is used to pass the drop orientation test within a total of 5 devices)
Panasonic's test method is based on the above "MIL-STD 810F Method 516.5-Shock". However, the drop height was changed from 122 cm (4 feet) to 200 cm (6.6 feet) dropping onto 3 cm (0.1 feet) thick plyboard. This drop test was passed.
(Disregarding appearance change such as loss of paint or distortion of the part where drop impact is applied.)

■ Handling of the camera

- Waterproofing is not guaranteed if the unit is subject to an impact as a result of being hit or dropped, etc. If an impact to the camera occurs, it should be inspected (subject to a fee) by a Panasonic's Service Center to verify that the waterproofing is still effective.
- When the camera is splashed with detergent, soap, hot spring, bath additive, sun oil, sun screen, chemical, etc., wipe it off immediately.
- Waterproof function of the camera is for sea water and fresh water only.
- Any malfunction caused by customer misuse, or mishandling will not be covered by the warranty.
- The inside of this unit is not waterproof. Water leakage will cause malfunction.
- Supplied accessories are not waterproof (excluding Hand Strap).
- Card and battery are not waterproof. Do not handle with a wet hand. Also, do not insert wet card or battery into the camera.
- Do not leave the camera for a long period of time in places where temperature is very low (at ski resorts or at high altitude, etc.) or very high [above 40 °C (104 °F)], inside a car under strong sunlight, close to a heater, on the beach, etc. Waterproof performance may be degraded.

■ About the [Precautions] demonstration display ([Requirements for Underwater use])

- [Precautions] is displayed when the power is turned on for the first time after purchase, with the side door completely closed.
- Please check beforehand to maintain the waterproof performance.

1 Press ◄ to select [Yes], and press [MENU/SET].
- It will automatically skip to the clock setting screen if [No] is selected before it starts.

2 Press ◄/► to select the picture.

◄: Return to the previous screen

►: View the next screen

- It can be forcefully ended by pressing [MENU/SET].
- When it is forcefully ended while checking by turning the unit off or pressing [MENU/SET], [Precautions] is displayed every time the power is turned on.

3 After the final screen (12/12), press [MENU/SET] to finish.
- When [MENU/SET] is pressed after the final screen (12/12), [Precautions] is not displayed from the next time the power is turned on.
- This can also be viewed from [Precautions] in the [Setup] menu.

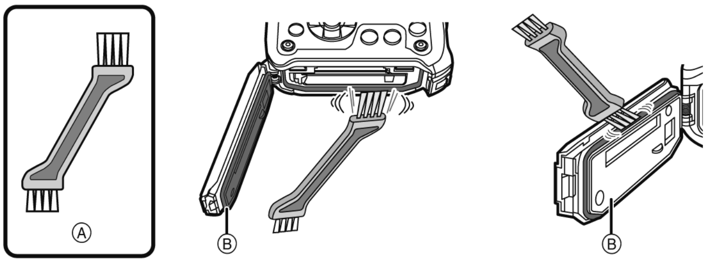
Check before using underwater

Do not open or close the side door in places with sand and dust, close to water, or with wet hands. Sand or dust adhering may cause water leaks.

1 Check that there are no foreign objects on the inner side of the side door.

- If there is any foreign object, such as lint, hair, sand, etc., on the surrounding area, water will leak within a few seconds causing malfunction.
- Wipe it off with a soft, dry cloth if there is any liquid.
  It may cause water leaks and malfunction if you use the camera with liquid adhered.
- If there is any foreign material, remove with supplied brush.
- Be extremely careful to remove any sand, etc. that may adhere to the sides and corners of the rubber seal.
- Remove large foreign objects, wet sand, etc., using the shorter (harder) side of the brush.

Ⓐ Brush (supplied)
Ⓑ Side door



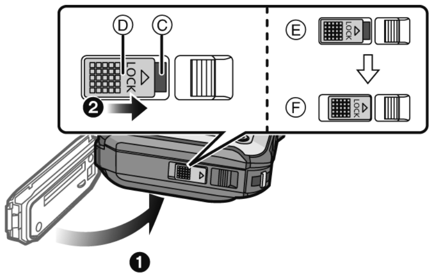
2 Check for cracks and deformation of the rubber seal on the side door.

- The integrity of the rubber seals may decrease after about 1 year, with use and age. To avoid permanently damaging the camera the seals should be replaced once each year. Please contact Panasonic's Service Center for related costs and other information.

3 Close the side door securely.

- Lock the [LOCK] switch securely until the red part is no longer visible.
- To prevent water seeping into the camera, be careful not to trap foreign objects such as liquids, sand, hair or dust, etc.

Ⓒ Red part
Ⓓ [LOCK] switch (gray part)
Ⓔ Released state
Ⓕ Locked state



Using the camera underwater

- Use the camera underwater to 12 m (40 feet) with the water temperature between 0 °C and 40 °C (32 °F and 104 °F).
- Do not use for scuba diving (Aqualung).
- Do not use the camera at a depth of over 12 m (40 feet).
- Do not use it in hot water over 40 °C (104 °F) (in the bath or hot spring).
- Do not use the camera underwater for longer than 60 minutes continuously.
- Do not open or close the side door underwater.
- Do not apply shock to the camera underwater. (Waterproof performance may not be maintained, and there is a chance of water leak.)
- Do not dive into the water holding the camera. Do not use the camera in a location where the water will splash strongly, such as rapid flow or waterfall. (Strong water pressure may be applied, and it may cause malfunction.)
- The camera will sink in the water. Take care not to drop the camera and lose it underwater by securely placing the strap around your wrist or similar measure.

Caring of the camera after using it underwater

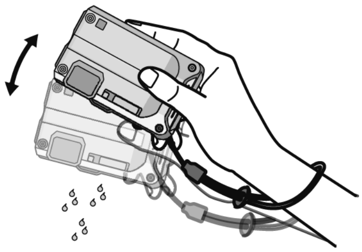
Do not open or close the side door until the sand and dust is removed by rinsing the camera with water.
Make sure to clean the camera after using it.
- Thoroughly wipe off any water droplets, sand, and saline matter on your hands, body, hair, etc.
- It is recommended to clean the camera indoors, avoiding places where water spray or sand may fall.

After using it underwater, always clean the camera rather than leaving it in a dirty state.
- Leaving the camera with foreign objects or saline matter on it may cause damage, discoloration, corrosion, unusual odour, or deterioration of the waterproof performance.

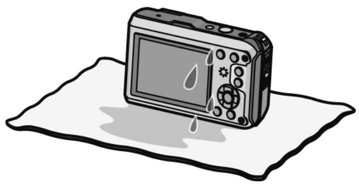
1 Rinse with water with the side door closed.
- After use at the seaside or underwater, soak the unit in fresh water pooled in a shallow container for about 10 minutes.
- If the zoom button or camera [ON/OFF] button do not move smoothly, it may be caused by an adhesion of foreign objects. Using in such a state may cause malfunctions, such as locking up, so wash off any foreign objects by shaking the camera in fresh water.
- Bubbles may come out of the drainage hole when you immerse the camera in water, but this is not a malfunction.



2 Drain water by holding the camera upside down and shaking it lightly a few times.
- After using the camera at the seaside or under water, or after washing it, water will remain at the speaker site of the camera for a while and it may cause lower sound or sound distortion.
- Fasten the strap firmly to prevent the camera from dropping.



3 Wipe off water drops on the camera with a soft, dry cloth and dry the camera in a shaded area that is well ventilated.
- Dry the camera by standing it on a dry cloth. This unit incorporates drain design, draining water in gaps in the camera [ON/OFF] button and zoom button, etc.
- Do not dry the camera with hot air from dryer or similar. Waterproof performance will deteriorate due to deformation.
- Do not use chemicals such as benzine, thinner, alcohol or cleanser, soap or detergents.

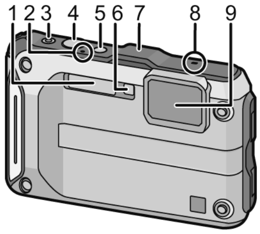


4 Confirm that there are no water droplets, open the side door, and wipe off any water droplets or sand left inside using a soft, dry cloth.
- Water droplets may adhere to the card or battery when the side door is opened without thoroughly drying. Also, water may accumulate in the gap around the card/battery slot or the terminal connector. Be sure to wipe any water off with a soft, dry cloth.
- The water droplets may seep into the camera when the side door is closed while it is still wet, causing condensation or failure.

5 Location of Controls and Components

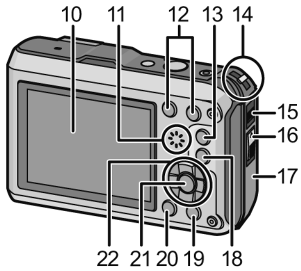
Names of the Components

1 Flash
2 GPS status indicator
3 Motion picture button
4 Shutter button
5 Camera [ON/OFF] button
6 Self-timer indicator /
AF Assist Lamp /
LED light
7 GPS antenna
8 Microphone
9 Lens



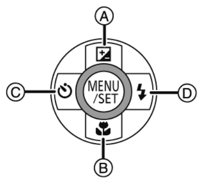
10 LCD monitor
11 Speaker
12 Zoom button
13 [▶] (Playback) button
14 Strap eyelet
- Be sure to attach the strap when using the camera to ensure that you will not drop it.

15 Release lever
16 [LOCK] switch
17 Side door
18 [MODE] button
19 [Q.MENU]/[🗑/↩] (Delete/Cancel) button

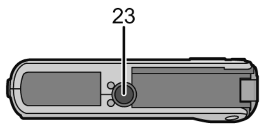


20 [DISP.] button
21 [MENU/SET] button

22 Cursor buttons
Ⓐ: ▲/Exposure compensation
Auto Bracket
Ⓑ: ▼/Macro Mode
AF Tracking
Ⓒ: ◄/Self-timer
Ⓓ: ►/Flash setting

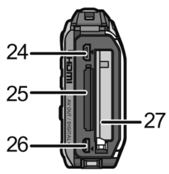


23 Tripod receptacle



24 [HDMI] socket
- Do not connect with any cable other than an HDMI micro cable (RP-CHEU15: optional). Doing so may cause malfunction.

25 Card slot
26 [AV OUT/DIGITAL] socket
27 Battery slot
- When using an AC adaptor, ensure that the Panasonic DC coupler (optional) and AC adaptor (optional) are used.



■ List of Recording Modes

P	**Program AE Mode**
	The subjects are recorded using your own settings.
iA	**Intelligent Auto Mode**
	The subjects are recorded using settings automatically selected by the camera.
M	**Manual Exposure Mode**
	The exposure is adjusted by the aperture value and the shutter speed which are manually adjusted.
	Sports Mode
	Use this mode to take pictures of sporting events, etc.
	Snow Mode
	This allows you to take pictures that show the snow as white as possible at a ski resort or a snow-covered mountain.
	Beach & Snorkeling Mode
	This mode is optimal for taking pictures underwater and at the beach.
	Underwater Mode
	This is optimal for taking pictures underwater deeper than 12 m (40 feet) by the use of the marine case (DMW-MCFT3: optional).
MINI	**Miniature Effect Mode**
	This is an imaging effect which defocuses the surroundings to make it look like a diorama. (also known as Tilt Shift Focus)
SCN	**Scene Mode**
	This allows you to take pictures that match the scene being recorded.
3D	**3D Photo Mode**
	Takes a 3D picture.

Note

• When the mode has been switched from Playback Mode to Recording Mode, the previously set Recording Mode will be set.

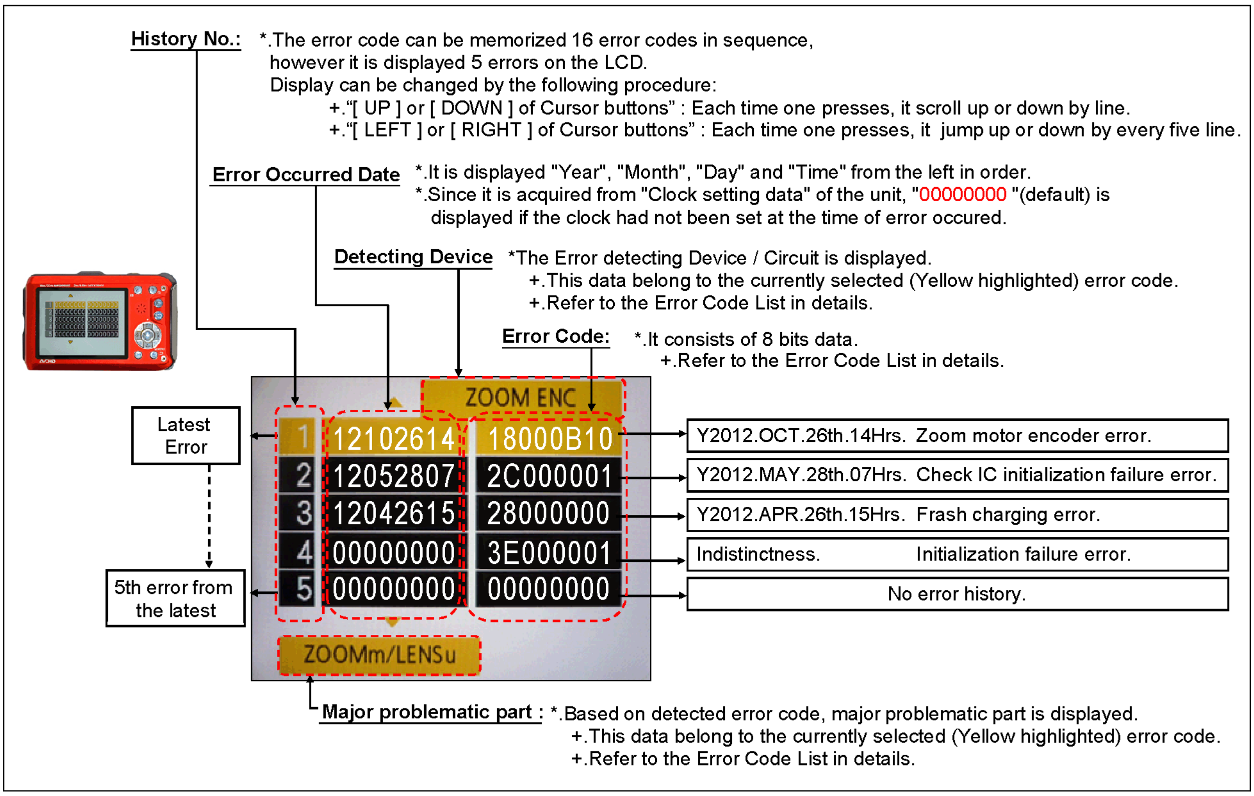
6 Service Mode

6.1. Error Code Memory Function

1. **General description**
   This unit is equipped with history of error code memory function, and can be memorized 16 error codes in sequence from the latest. When the error is occurred more than 16, the oldest error is overwritten in sequence.
   The error code is not memorized when the power supply is shut down forcibly (i.e.,when the unit is powered on by the battery, the battery is pulled out) The error code is memorized to FLASH ROM when the unit has just before powered off.
2. **How to display**
   The error code can be displayed by ordering the following procedure:

- **Preparation:**
  1. Attach the Battery to the unit.
     Note:
     *Since this unit has built-in memory, it can be performed without inserting SD memory card.
     *Select the mode other than "3D" mode (such as Program AE / iA / Sports / Snow / SCN) to display the error code.
- **Step 1. The temporary cancellation of "INITIAL SETTINGS":**
  While keep pressing "UP of Cursor button" and MOTION PICTURE button simultaneously, turn the Power on.
- **Step 2. Execute the error code display mode:**
  Press the "LEFT of Cursor button", MENU/SET button and MOTION PICTURE button simultaneously.
  The display is changed as shown below when the above buttons are pressed simultaneously.
  Normal display → Error code display → CAMERA INFO → Normal display → .....

Example of Error Code Display



3. **Error Code List**

The error code consists of 8 bits data and it shows the following information.

Attribute	Main item	Sub item	Error code		Contents (Upper)	Error Indication	
			High 4bits	Low 4 bits	Check point (Lower)	Detecting device	Part/Circuit
LENS	Lens drive	OIS	18*0	1000	PSD (X) error. Hall element (X axis) position detect error in OIS unit.	OIS X	LENSu NG
					OIS Unit		
				2000	PSD (Y) error. Hall element (Y axis) position detect error in OIS unit.	OIS Y	
					OIS Unit		
				3000	GYRO (X) error. Gyro (IC6301) detect error on Top P.C.B.	GYRO X	GYRO NG
					IC6301 (Gyro element) or IC6001 (VENUS ENGINE)		
				4000	GYRO (Y) error. Gyro (IC6302) detect error on Top P.C.B.	GYRO Y	
					IC6302 (Gyro element) or IC6001 (VENUS ENGINE)		
				5000	MREF error (Reference voltage error).	OIS REF	LENSSd/DSP NG
					IC9101 (LENS DRIVE) or IC6001 (VENUS ENGINE)		
				6000	Drive voltage (X) error.	OISX REF	LENSu/LENS FPC
					LENS Unit, LENS flex breaks, IC6001(VENUS ENGINE) AD value error, etc.		
				7000	Drive voltage (Y) error.	OISY REF	
					LENS Unit, LENS flex breaks, IC6001(VENUS ENGINE) AD value error, etc.		
		Zoom		0?10	Collapsible barrel Low detect error (Collapsible barrel encoder always detects Low.)	ZOOM L	ZOOMm/ LENSu
					Mechanical lock, FP9002-(40) signal line or IC6001 (VENUS ENGINE)		
				0?20	Collapsible barrel High detect error (Collapsible barrel encoder always detects High.)	ZOOM H	
					Mechanical lock, FP9002-(40) signal line or IC6001 (VENUS ENGINE)		
				0?60	The zoom position jump is detected due to the impact (i.e. drop.) to the camera occurs.	(No indication)	(No indication)
					Lens unit		
		Focus		0?01	HP High detect error (Focus encoder always detects High, and not becomes Low)	FOCUS L	LENS FPC/ DSP
					Mechanical lock, FP9002-(40) signal line or IC6001 (VENUS ENGINE)		
				0?02	HP Low detect error (Focus encoder always detects Low, and not becomes High)	FOCUS H	
					Mechanical lock, FP9002-(40) signal line or IC6001 (VENUS ENGINE)		
		Lens	18*1	0000	Power ON time out error.	LENS DRV	LENSu
					Lens drive system		
			18*2	0000	Power OFF time out error.		
					Lens drive system		
	Adj.History	OIS	19*0	2000	OIS adj. Yaw direction amplitude error (small)	OIS ADJ	OIS ADJ
				3000	OIS adj. Pitch direction amplitude error (small)		
				4000	OIS adj. Yaw direction amplitude error (large)		
				5000	OIS adj. Pitch direction amplitude error (large)		
				6000	OIS adj. MREF error		
				7000	OIS adj. time out error		
				8000	OIS adj. Yaw direction off set error		
				9000	OIS adj. Pitch direction off set error		
				A000	OIS adj. Yaw direction gain error		
				B000	OIS adj. Pitch direction gain error		
				C000	OIS adj. Yaw direction position sensor error		
				D000	OIS adj. Pitch direction position sensor error		
				E000	OIS adj. other error		

Attribute	Main item	Sub item	Error code		Contents (Upper)	Error Indication	
			High 4bits	Low 4 bits	Check point (Lower)	Detecting device	Part/Circuit
HARD	VENUS A/D	Flash	28*0	0000	Flash charging error.	STRB CHG	Flash CON P.C.B./FPC
					IC6001-(AC16) signal line or Flash charging circuit		
	FLASH ROM (EEPROM Area)	FLASH ROM (EEPROM Area)	2B*0	0001 0003 0004	EEPROM read error	FROM RE	FROM
					IC6002 (FLASH ROM)		
				0002	EEPROM write error	FROM WR	FROM
					IC6002 (FLASH ROM)		
				0005	Firmware version up error	(No indication)	(No indication)
					Replace the firmware file in the SD memory card.		
				0008	SDRAM error		
				0009	SDRAM Mounting defective		
	SYSTEM	RTC	2C*0	0001	SYSTEM IC initialize failure error	SYS INIT	Main P.C.B.
					Communication between IC6001 (VENUS ENGINE) and IC9101 (SYSTEM)		
SOFT	CPU	Reset	30*0	0001 | 0007	NMI reset Non Mask-able Interrupt (30000001-30000007 are caused by factors)	NMI RST	Main P.C.B.
	Card	Card	31*0	0001	Card logic error	SD CARD	SD CARD/ DSP
					SD memory card data line or IC6001 (VENUS ENGINE)		
				0002	Card physical error		
					SD memory card data line or IC6001 (VENUS ENGINE)		
				0004	Write error	SD WRITE	
					SD memory card data line or IC6001 (VENUS ENGINE)		
			39*0	0005	Format error	INMEMORY	FROM
	CPU, ASIC hard	Stop	38*0	0001	Camera task finish process time out.	LENS COM	LENSu/DSP
					Communication between Lens system and IC6001 (VENUS ENGINE)		
				0002	Camera task invalid code error.	DSP	DSP
					IC6001 (VENUS ENGINE)		
				0100	File time out error in recording motion image		
					IC6001 (VENUS ENGINE)		
				0200	File data cue send error in recording motion image		
					IC6001 (VENUS ENGINE)		
				0300	Single or burst recording brake time out.		
		Memory area	3A*0	0008	USB work area partitioning failure	(No indication)	(No indication)
					USB dynamic memory securing failure when connecting		
	Operation	Power on	3B*0	0000	FLASHROM processing early period of camera during movement.	INIT	(No indication)
	Zoom	Zoom	3C*0	0000	Imperfect zoom lens processing	ZOOM	ZOOMm/ LENSu
					Zoom lens		
			35*0	0000 | FFFF	Software error (0-7bit : command, 8-15bit : status)	DSP	DSP
			35*1	0000	Though record preprocessing is necessary, it is not called.		
			35*2	0000	Though record preprocessing is necessary, it is not completed.	(No indication)	(No indication)

1) About "*" indication:

The third digit from the left is different as follows.

In case of 0 (example: 18 **0** 01000)

When the third digit from the left shows "0", this error occurred under the condition of INITIAL SETTINGS has been completed.
It means that this error is occurred basically at user side.

In case of 8 (example: 18 **8** 01000)

When the third digit from the left shows "8", this error occurred under the condition of INITIAL SETTINGS has been released.
(Example; Factory assembling-line before unit shipment, Service mode etc.)
It means that this error is occurred at service side.

2) About "?" indication: ("18*0 0?01" to "18*0 0?50"):

The third digit from the right shows one of the hexadecimal ("0" to "F") character.

4. **How to returned to Normal Display:**
Turn the power off and on, to exit from Error code display mode.

Note:
The error code can not be initialized.

6.2. ICS (Indication of additional Camera Settings when picture was taken) function

1. General description

This unit is equipped with ICS (ICS: **I**ndication of additional **C**amera **S**ettings when picture was taken) function by playing back the concerned picture on the LCD display.
(This function is achieved by utilizing "maker note" data stored in Exif data area of recorded picture file.)
To proceed failure diagnosis, use this ICS function together with "displaying the recorded picture with picture information" function.

Note:

*.The ICS function operates with a picture which is only taken with the same model. (It may not be displayed when the picture was taken with other model.)

*.Since Exif data is not available after the picture is edited by PC, the ICS function may not be activated.

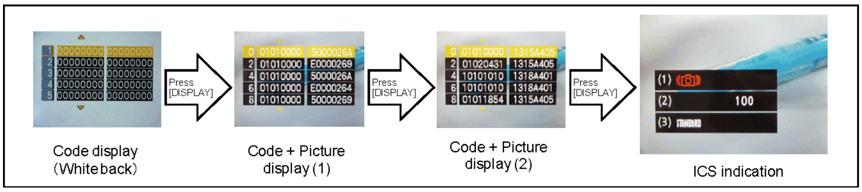
2. How to display

The ICS data is displayed by ordering the following procedure:

- **Preparation:**
  1.Attach the Battery to the unit.
  Note:
  *Select the mode other than "3D "mode (such as Program AE / iA / Sports / Snow / SCN) to display the ICS data.

- **Step 1. The temporary cancellation of "INITIAL SETTINGS":**
  While keep pressing "UP of Cursor button" and MOTION PICTURE button simultaneously, turn the Power on.

- **Step 2. Execute the ICS display mode:**
  Press the PLAYBACK button.
  Select the concerned picture by pressing the "LEFT and RIGHT of Cursor button".
  Press the "LEFT of Cursor button", MENU/SET button and MOTION PICTURE button simultaneously.
  Press the DISPLAY button, 3 times.
  The display condition is changed as shown below when the DISPLAY button is pressed.
  Code display → Code + Picture display (1) → Code + Picture display (2) → ICS display → .....



3. How to read

(1). Jitter alert was displayed or not:

This part shows that the "Jitter alert" mark was displayed or not when the picture has just before been taken.

+.With "Jitter alert" mark : The "Jitter alert" mark was displayed.

+.Without "Jitter alert" mark: The "Jitter alert "mark was not displayed.

[About "Jitter alert" mark]

Due to lacking the enough light amount etc, shooting condition prone to make a "hand jitter", the "Jitter alert" mark is displayed.

[Reference Guide]

(Applicable settings : Normal picture mode, ISO100, WIDE edge, Flash OFF)

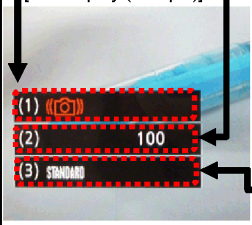
+.The "Jitter alert" mark is displayed when the shutter speed is 1/15th and below.

Normal playback screen
(Recorded picture with information)



*In playback mode, the picture information is displayed when pressing the [DISPLAY] button.
(It can be confirmed at user as well.)
*Use this indication together with ICS function.

[ICS display (Sample)]



(1). Jitter alert mark : [Indicated]
(2). ISO sens. setting: ISO100 (Fixed)
(3). Color mode setting: Standard

(2). ISO Sensitivity Setting condition:

This part shows that the "ISO Sensitivity" setting condition when the picture had been taken.

(Note: The [i ISO] is displayed when the "Intelligent ISO " was selected.)

For instance, when the recorded picture information shows [ISO100], it can be confirmed the ISO setting condition ; [AUTO], [INTELLIGENT ISO] or [ISO100](Fixed: set by user).

[Point for Confirmation]

*The symptom is "Picture with "hand jitter". Subject is not clearly stopped." in darker scene, does the picture was taken with lower ISO setting mode?

*The symptom is "Noisy picture. Rough picture image" in brighter scene, does the picture was taken with higher ISO setting mode?

(3). Color mode Setting condition:

This part shows that the "Color mode" setting condition when the picture had been taken.

[Point for Confirmation]

*The symptom is "Color is strange. The picture is bluish (Yellowish) ", does the picture was taken with [SEPIA] / [B & W] / [VIVID] settings ?

NOTE: As for the symptom related with the color, confirm the picture information which is displayed in normal playback screen as well.

(In normal playback screen, the setting condition of "White balance" and "WB Adjustment" can be confirmed.)

[Reference Guide : Settings "When taking picture"]

<ISO SENSITIVITY>

*This allows the sensitivity to light (ISO sensitivity) to be set. Setting to a higher number enables pictures to be taken even in dark places without the resulting pictures coming out dark.

*In this unit, it can be set one of the [i ISO], [100], [200], [400], [800] and [1600] in "Normal Picture Mode".

*[iISO] (Intelligent ISO sensitivity control)

The camera detects movement of the subject and then automatically sets the optimum ISO sensitivity and shutter speed to suit the movement of the subject and brightness of the scene to minimize the jitter of the subject.

*The ISO sensitivity is automatically set under the following conditions.

– When recording motion pictures

– When [Burst] in the [Rec] menu is set to [H] or [ ]

Settings	Description of settings
[AUTO]	The ISO sensitivity is automatically adjusted according to the brightness. • Maximum [400] (With the flash on [1600])
[iISO] ([i.ISO])	The ISO sensitivity is adjusted according to the movement of the subject and the brightness. • Maximum [1600]
[100]	The ISO sensitivity is fixed to various settings.
[200]	
[400]	
[800]	
[1600]	

	[100] →	**[1600]**
Recording location (recommended)	When it is light (outdoors)	When it is dark
Shutter speed	Slow	Fast
Noise	Less	Increased
Jitter of the subject	Increased	Less

<COLOR MODE>

*Using these modes, the pictures can be made sharper or softer, the colors of the pictures can be turned into sepia colors or other color effects can be achieved.

*In this unit, it can be set one of the following effects in "Intelligent Auto Mode" and "Normal Picture Mode".

Settings	Description of settings
[STANDARD]	This is the standard setting.
[Happy] *1	Image with enhanced brightness and vividness.
[VIVID] *2	The picture becomes sharper.
[B&W]	The picture becomes black and white.
[SEPIA]	The picture becomes sepia.

*1 This can be set only when Intelligent Auto Mode is set.
*2 This can be set only during Normal Picture Mode.

4. How to exit

Simply, turn the power off. (Since ICS function is executed under the condition of temporary cancellation of "INITIAL SETTINGS",it wake up with normal condition when turn off the power.)

7 Troubleshooting Guide

7.1. Service and Check Procedures

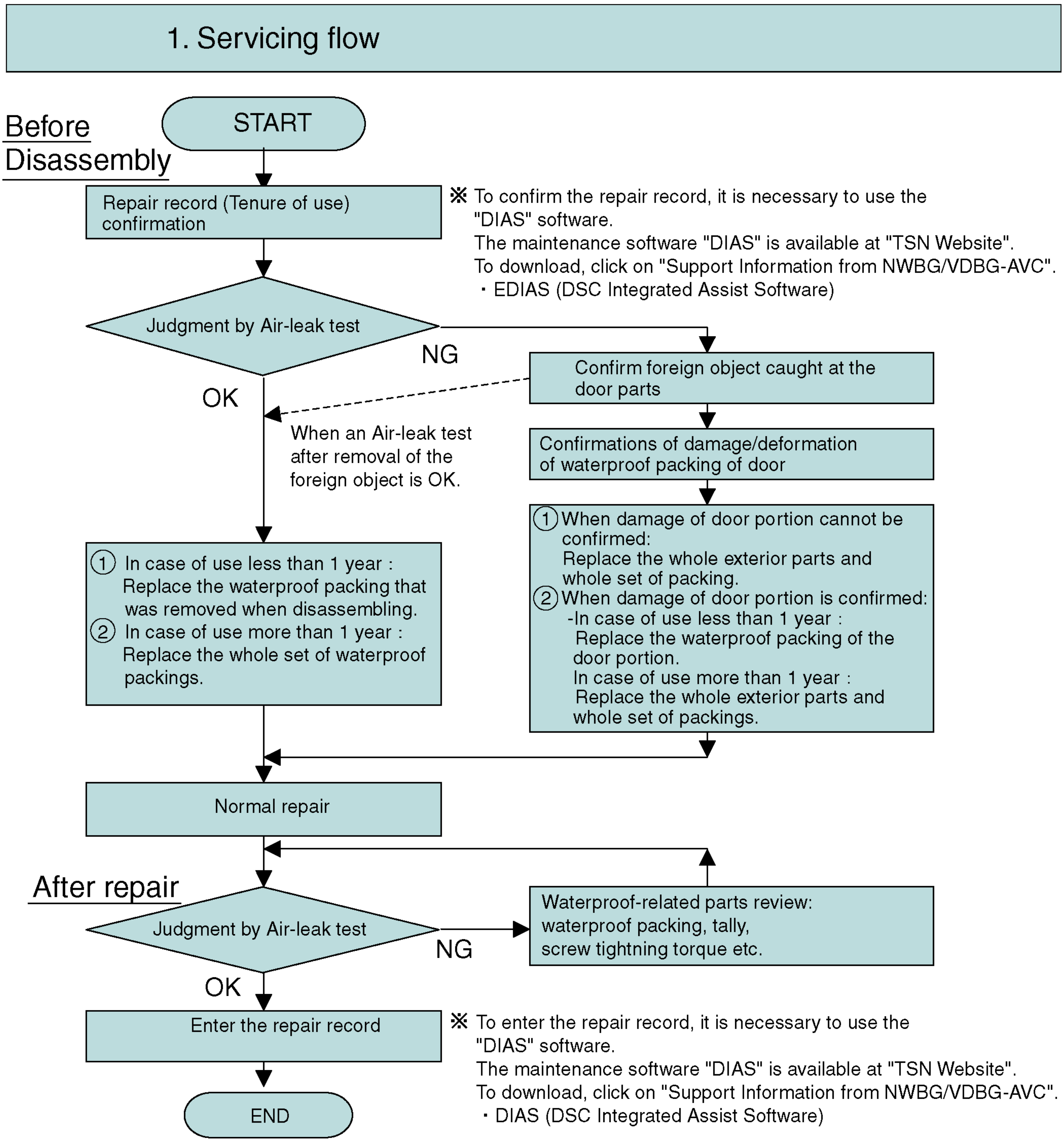
7.1.1. Servicing flow

- The following is the servicing procedure including assembly/disassembly process.
- As for the air-leak test, refer to "7.2. Air-leak Test".

< Note >

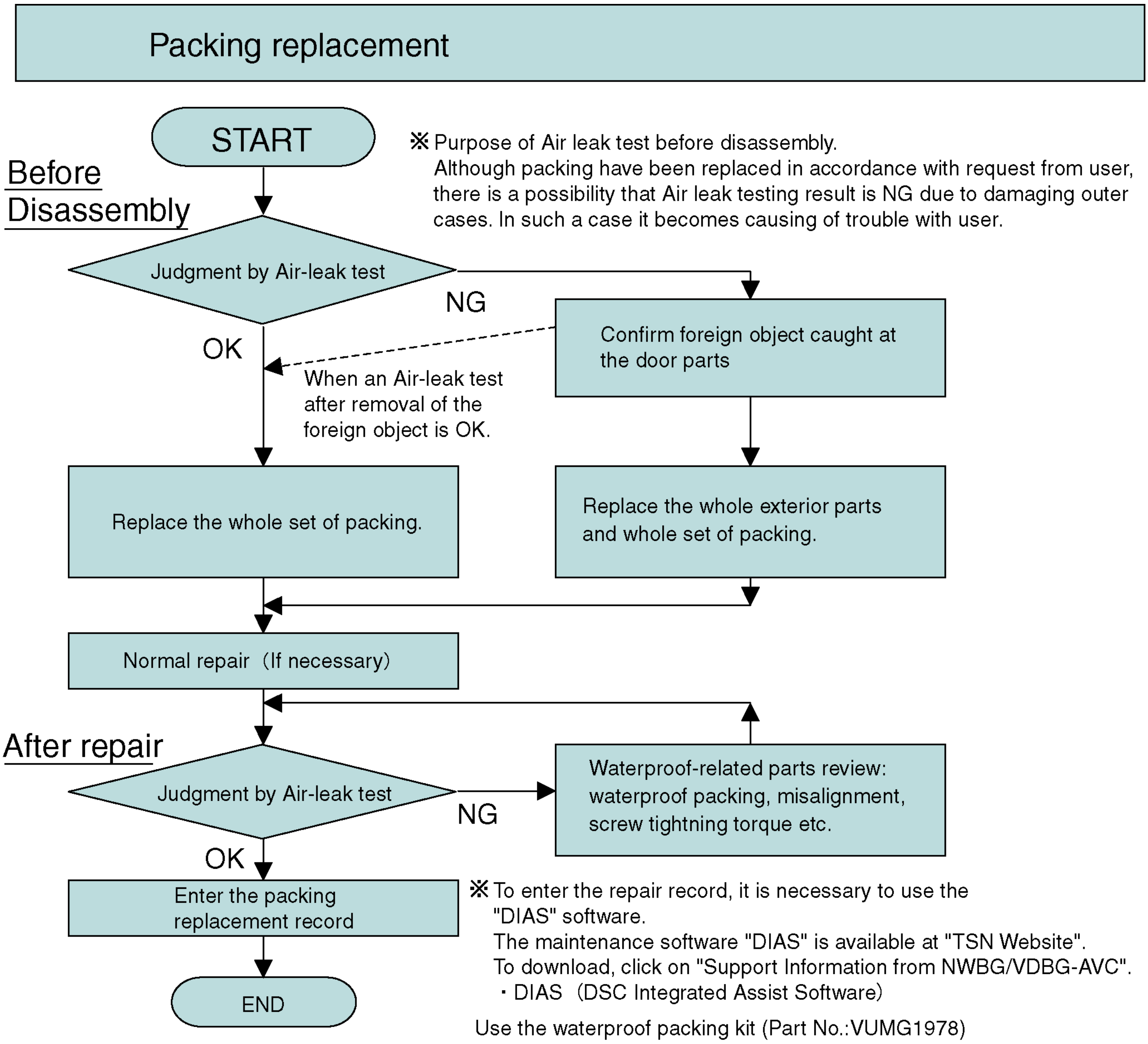
Air-leak test (inspection) before taking service measure:

- When the first inspection, do not perform cleaning (removal of foreign objects caught etc.) of the waterproof packing parts (battery door and Jack door) from the viewpoint of the cause investigation at NG of test (inspection) result.
- When the test (inspection) result was NG, perform test again after cleaning of waterproof packing parts.



7.1.2. Periodical maintenance (Packing replacement) flow

- The integrity of the waterproof packings may decrease about 1 year, with use and age.
  (We recommend end-users to replace the waterproof packing at least once each year described in the operating instructions.)
- Please use waterproof packing kit (Part No.: VUMG1978). (5 types, 8 packings in total are included)
- Do not touch the waterproof packings directly by the hand.
- Do not perform cleaning of waterproof packings by the solvent of alcohol etc. or by blowing air.
- Take care not to put any foreign objects (garbage and dust).
- As for the air-leak test, refer to "7.2. Air-leak Test".

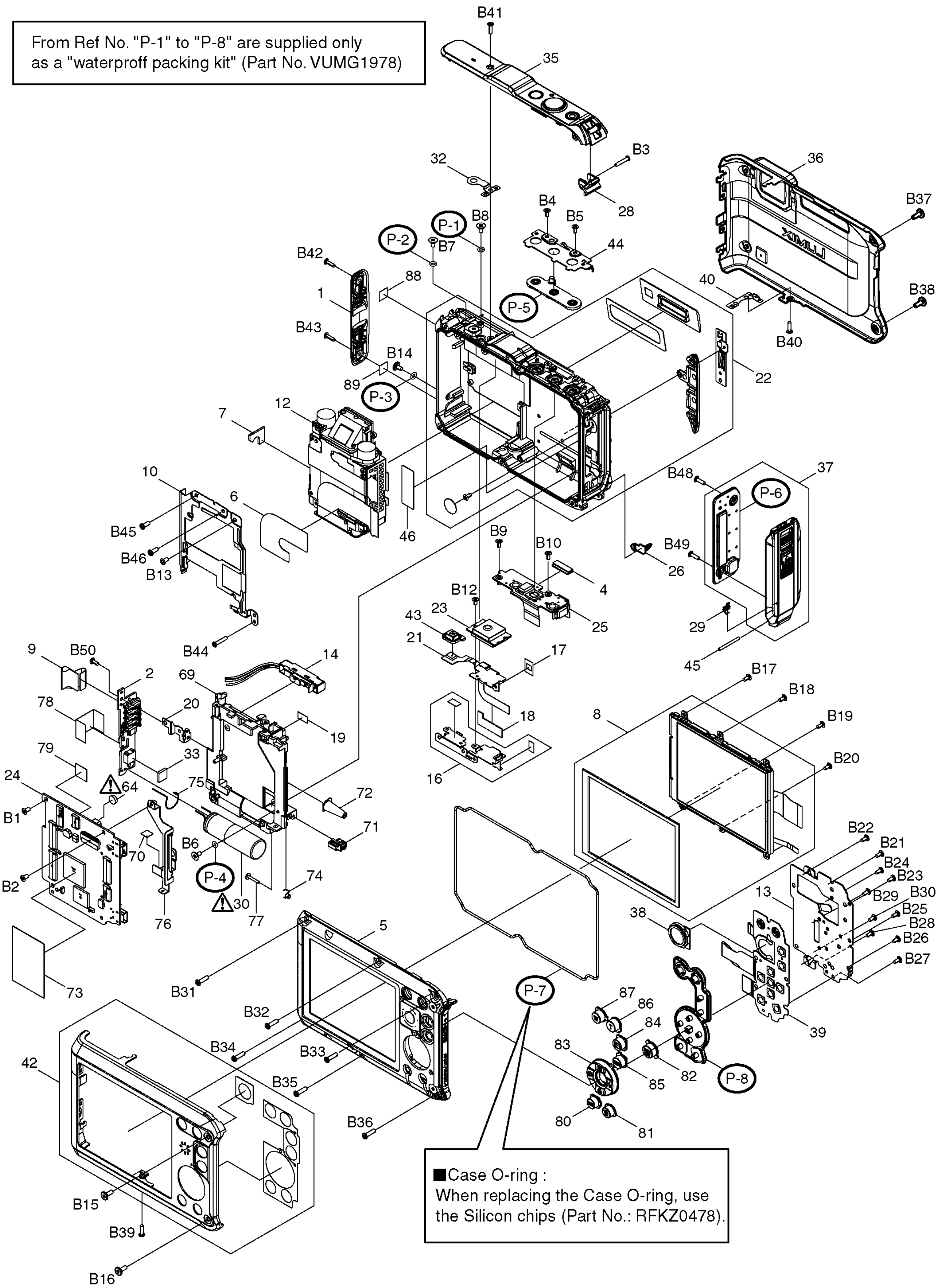


Replacing the waterproof packing

- The location of waterproof packing are shown at right. (5 types, 8 packings in total)
- Waterproof packings are supplied as Waterproof packing kit (Part No.: VUMG1978).

< Note for replacement >

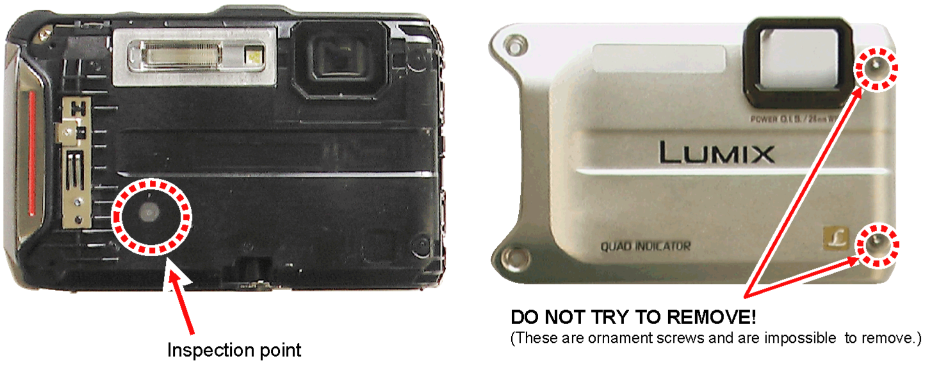
- Do not touch the waterproof packings directly by the hand.
- Do not perform cleaning of waterproof packings by the solvent of alcohol etc. or by blowing air.
- Take care not to put any foreign objects (garbage and dust).
- Use the silicon chips (Part No.: RFKZ0478) when replacing the Case O-ring.



7.2. Air-leak Test

Due to the waterproof performance retention, perform the air-leak test using Air-leak tester (Part No.:RFKZ0528) before/after servicing when disassembling and assembling the unit.
*The Air-leak test before servicing is necessary to be performed to check whether the malfunction occurred due to air-leak or not.

1. Preparation:
   1) By referring the "9.3. Disassembly procedures", remove the side ornament (R) and front aluminum case.
   2) Confirm that no foreign objects at the side door, and it is firmly closed.



2. Air-leak Test (Inspection):
   *Perform the air-leak test by referring the following procedure.

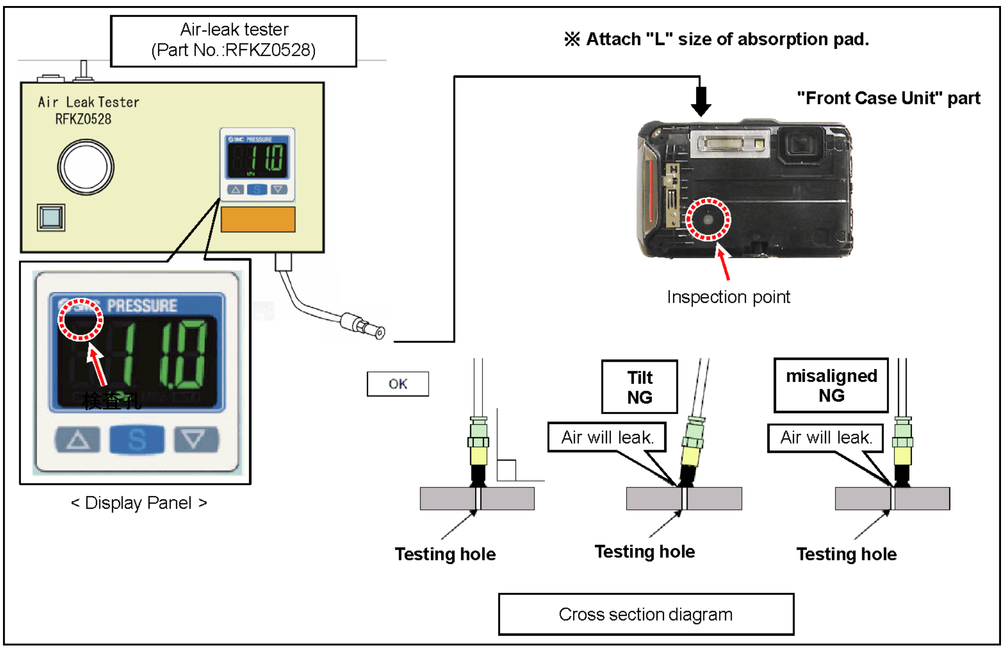
   Note:
   As for the detail instruction of air-leak tester, refer to the operating guide (attached to the product).

   [Preparation]
   1. Put the camera with the top case facing upward condition.
   2. Set the following measurement pressure value on the air-leak tester. (Part No.:RFKZ0528).

[Measurement pressure value] :-33kPa

   *About the Setting methods, refer to the operating guide for air-leak tester.
   3. Attach "L" size of absorption pad to the tip of the hose of the air-leak tester.
   4. Put the absorption pad of air-leak tester vertically on the Microphone part.

   Note:
   - **Keep firmly hold above condition until the measurement is completed.**
   Once pad is tilted/misaligned from the test hole during testing process, start it from this step.



■Measuring condition (For DMC-FT4, DMC-TS4)

Item		Specifications	Remarks
Setting pressure		- 3 3 k P a	
Setting stand value		- 3 0 k P a	
Exhusted period		90sec.	
Stand-by period		15sec.	
Measuring time*1 (Period)		30sec.	
Testing*1 Specification	Stabilization	Between -30kPa and -33kPa	*1 It must be stabilized between -30kPa and -33kPa, with a deviation of +/- 0.2kPa, within 30 seconds.
	Deviation	±0.2kPa	

*Attach "L" size of absorption pad.

[Exhaust Air]

5. Operate the measurement switch of the air-leak tester to exhaust air inside the product for 90 seconds.

[Stand-by]

6. After a laps of 15 seconds, take a note (Record) that the pressure value indicated on the indication panel.

[Measurement]

7. Confirm that the pressure value fluctuations during measurement process are within the testing specifications

[Measuring time] : 3 0 seconds
[Testing Specification] :Stabilization :Between -30kPa and -33kPa
Deviation : ± 0.2kPa

The air-leak test is now completed.

3. Packing replacement record input:
   - To enter the repair record, it is necessary to use the "DIAS" software. The maintenance software "DIAS" is available at "TSN Website".
     To download, click on "Support Information from NWBG/VDBG-AVC".
     *DIAS (DSC Integrated Assist Software)

7.3. Checking Method of GPS failure

1. **GENERAL DESCRIPTION**

About the location name information of this unit
Be sure to read the “User License Agreement for Location Name data”.

When [GPS Setting] is set to [ON], GPS function will operate even when the power is turned off.
- Electromagnetic waves, etc. from this unit may affect other electronic devices, so set [GPS Setting] to [OFF] or [Airplane Mode] to [ON] and turn the power of the unit off during plane takeoff or landing, or in an area where use is prohibited.
- Battery power is consumed even if the power is turned off when [GPS Setting] is set to [ON].

About the information of recording location
- Location names of the recording locations or landmarks (such as name of the building, etc.) are as of December 2011. Information will not be updated.
- Depending on the country or the region, there may be less information for location names and landmark names.

About the positioning
- It will take longer for positioning in an environment where it is harder to receive the radio waves from the GPS satellites.
- **Even if the receiving condition of the radio waves is excellent, it may take approx. 2 to 3 minutes to complete the positioning when performing positioning for the first time or when you perform positioning after turning on the power again after turning the unit off with the [GPS Setting] set to [OFF] or [Airplane Mode] set to [ON].**
- The positions of the GPS satellites are changing constantly, so positioning may not be performed or the information may have errors depending on the recording location or conditions.

When used during overseas travel etc.
- The GPS may not operate in China or close to the Chinese border in neighbouring countries. (As of December 2011)
- The usage of GPS etc., may be restricted depending on the country or the region. This camera has a GPS function, so check with the embassies or travel agencies, etc. prior to your overseas travel regarding any restrictions on cameras with a built-in GPS function.

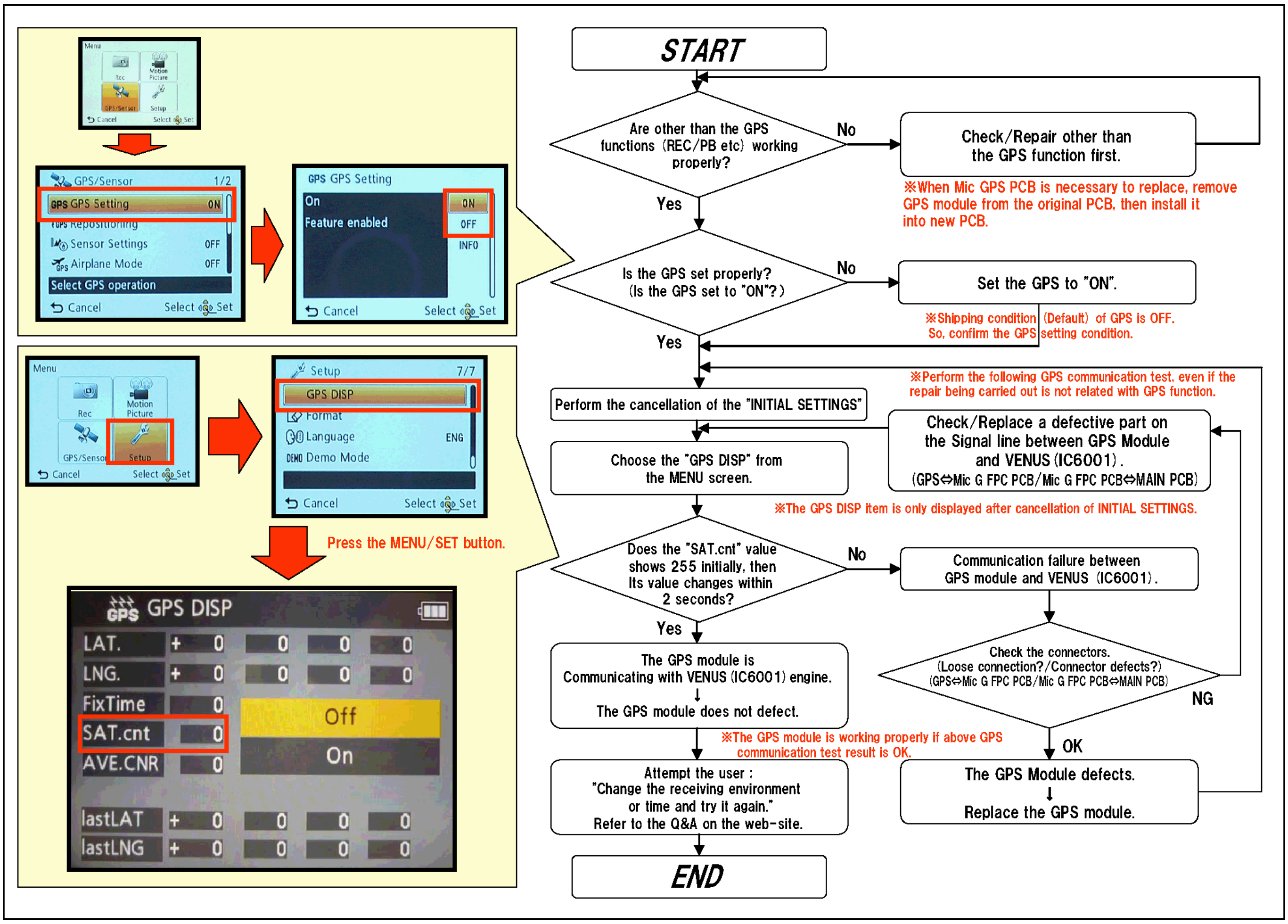
2. **Checking flowchart of GPS failure.**

The checking flowchart of GPS failure is as follows:

Note:

*Perform the GPS communication test, even if the repair being carried out is not related with GPS function.

*The GPS function in this unit is performed communication between GPS module (Mic GPS FPC Unit) and VENUS (IC6001: on the Main P.C.B.).

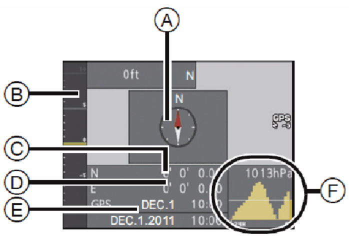


7.4. Checking Method of compass, altimeter, & barometer

1. GENERAL DESCRIPTION

This unit is possible to display or store in recorded pictures the environmental information of the recording location utilizing the built-in compass, altimeter, and barometer.
(To display the compass, altimeter, and barometer, set [GPS Setting] to [ON].

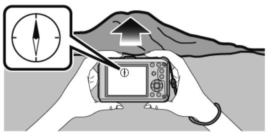
Ⓐ Compass
Ⓑ Altimeter
Ⓒ Latitude
Ⓓ Longitude
Ⓔ Time positioning was performed
Ⓕ Barometer



2. ABOUT EACH SENSOR
2.1. COMPASS
2.1.1. General description

8 bearings are measured based on the direction the lens of the camera is pointing in.
• The colored portion of the compass needle points north.
• When [GPS Setting] is set to [OFF], magnetic declination is not corrected.

North

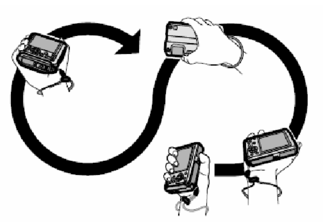


About the declination adjustment
Earth is a giant magnet with the South Pole at the Geographic North Pole and the North Pole at the Geographic South Pole, and the magnetism the Earth has is called "geomagnetism". There is a difference between the angle of the "magnetic north" that a magnetic compass points to and the geographical "true north" due to the effect of the "geomagnetism". The difference between these angles is called "declination".
The compass in this unit points "true north", when it corrects "magnetic declination" based on the latitude and longitude acquired in the GPS positioning.
• The size of the magnetic declination can change as you move to different locations, so we recommend that you set [GPS Setting] to [ON] and perform positioning regularly to update your latitude/longitude.

Note
• It may not measure correctly when you measure with this unit upside down.
• The bearing measurement value may be affected in locations with weak geomagnetism.
• It may not measure accurately if close to the following objects:
  – Permanent magnets (metals in magnetic necklaces, etc.)/metallic objects (steel desks, lockers, etc.)/high-voltage lines or overhead wires/household appliances (TVs, PCs, mobile phones, speakers, etc.)
• It may not measure accurately in the following locations:
  – Inside cars/trains/ships/airplanes/rooms (when the steel beams are magnetized)

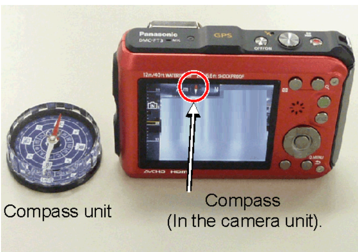
2.1.2. Failure diagnosis of Compass.
The Compass sensor unit is IC9301 which is located on TOP FPC unit.
Since the IC9301 does not supply as a spare parts, replace as a TOP FPC unit if necessary.

Settings/Condition:
1. Release the initial settings to be forcefully turned off the declination adjustment:
2. Turn on the GPS setting.
3. Press the Display button to display the compass, altimeter, & barometer.
4. Select [Calibrate compass] on the [GPS/Sensor] menu, and then press [MENU/SET].
5. Securely hold the unit vertically, and adjust by turning it in a figure 8 a few times rolling your wrist.



The "Calibration successful" is displayed when the adjustment is successful.

Diagnosis:
1. When both of the red arrow of compass unit and camera unit's one point same direction, the built-in compass unit works fine.



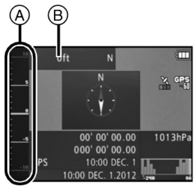
2.2. ALTIMETER

2.2.1. General description

You can check the altitude of the current location.

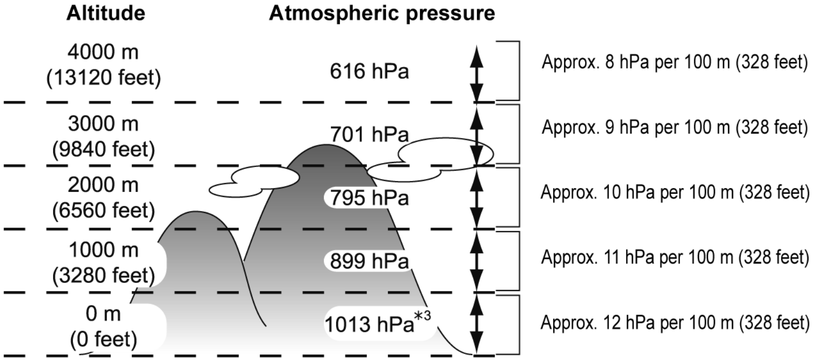
- Displaying range is –600 m (–2000 feet) to 9000 m (30000 feet).
- A depth meter will be displayed instead of the altimeter in [Beach & Snorkeling] mode.

Ⓐ Altitude
Ⓑ Current altitude



■ About altitude conversion

The displayed altitude is a relative altitude*1. The altitude is a value calculated by converting an atmospheric pressure within the unit to an altitude with 0 m (0 feet) (sea level) = 1013 hPa*2 as a reference.



*1 Altitude can be expressed in two forms — as an altitude above sea level (absolute height from sea surface) or as a relative altitude (difference in altitude between two locations). This unit displays a relative altitude estimated by a method which uses the relationship between the altitude and atmospheric pressure in the ISA [International Standard Atmosphere], as specified by the ICAO [International Civil Aviation Organization].

*2 “hPa (hectopascal)” is a unit used to represent atmospheric pressure.

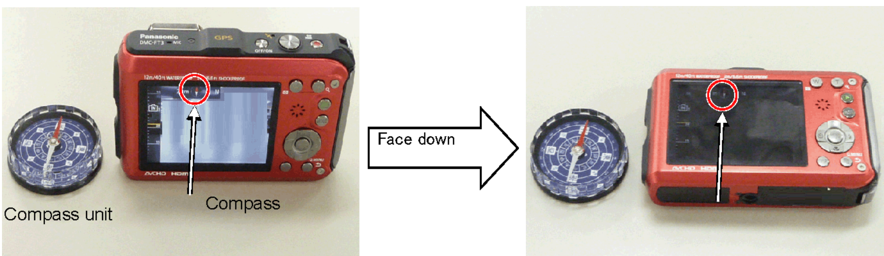
*3 Readings fluctuate with the weather. Adjust frequently with [Adjust] in [Altimeter].

2.2.2. Failure diagnosis of Altimeter.

The Altimeter sensor unit is IC9202 which is located on Main PCB.
(It detects direction of gravitation.)

Settings/Condition:

1.After performing the compass failure diagnosis, face down (the LCD side up) the camera unit, gradually.



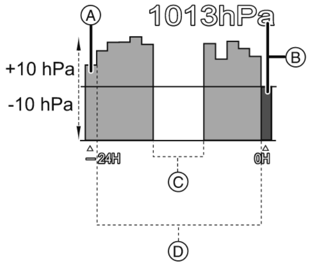
Diagnosis:

1.When the compass in the camera unit points same direction before and after above condition, the built-in altimeter unit works fine.

2.3. BAROMETER

2.3.1. General description

With the current atmospheric pressure as a reference, it is displayed on the graph within the range of −10 hPa to +10 hPa.
(Atmospheric pressure out of range cannot be displayed in details)



Ⓐ 24 hours earlier
Ⓑ Present
Ⓒ Time periods for which history was not recorded (white portion)
Ⓓ Atmospheric pressure information in 90 minute intervals

- The barometer is an indicator of changes between fine weather and rain.
  – When the atmospheric pressure rises: Weather tends to recover
  – When the atmospheric pressure drops: Weather tends to worsen

Note

- In the following cases, atmospheric pressure is not recorded on the graph.
  – When [GPS Setting] is set to [ON], the battery is low, and the power is off
  – When [Airplane Mode] is set to [ON] and the power is off
  – When [Sensor Settings] is set to [OFF]
  – [Underwater]
- When the displayable range (current atmospheric pressure of −10 hPa to +10 hPa from the reference pressure) is exceeded, the atmospheric pressure will not be displayed correctly.

■ About the measured altitude and atmospheric pressure

- Altitude value may show errors depending on the change in atmospheric pressure compared to areas such as locations with altimeter reference signs. Perform frequently with [Adjust] in [Altimeter].
- Altitude announced onboard an airplane is measured using the atmospheric pressure surrounding the airplane. It does not match the altitude actually measured inside the airplane.
- Even if the unit is fixed at a constant altitude, the measured altitude may fluctuate due to the effects of change in atmospheric pressure.
  In coastal areas, the altitude changes by 1 m (3.3 feet) per 0.12 hPa.
- Altitude and atmospheric pressure may not be measured accurately in the following cases:
  – When there is a significant change in weather conditions (Pressure and air temperature)
  – When there is a movement with a rapid change in altitude
  – When pressure is applied to the front or rear of this unit∗1
  – When this unit is wet (after using underwater, etc.)∗2
  – When closing the side door∗2



∗1 Hold this unit as shown in the figure when measuring.
∗2 It will adapt to the ambient atmospheric pressure within a few minutes, and display correct measurement values.

2.3.2. Failure diagnosis of Barometer.

The barometer sensor unit is IC9201 which is located on Main P.C.B.

Settings/Condition:

1.After performing the altimeter failure diagnosis, take a note that the altimeter which is currently indicated on the LCD.

Diagnosis:

1. Do not turn off the power, but simply open the side door.
   In this case, the altimeter value is increased.
2. Close the side door again.
   In this case, the altimeter value is decreased.

After a while the value becomes closer to original value, the built-in barometer unit works fine.

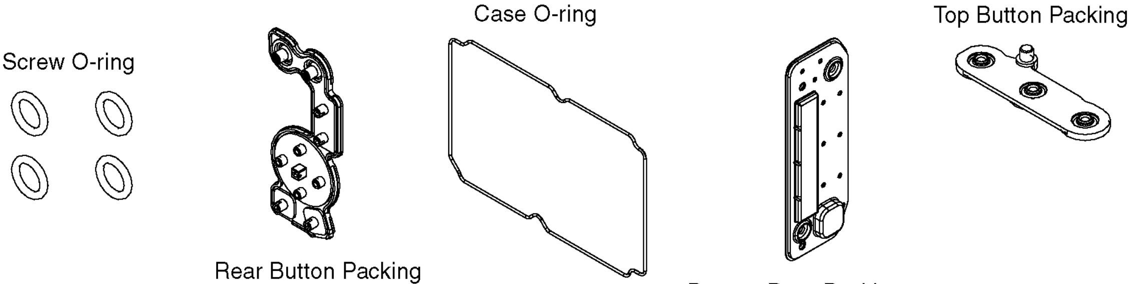
8 Service Fixture & Tools

8.1. Service Fixture and Tools

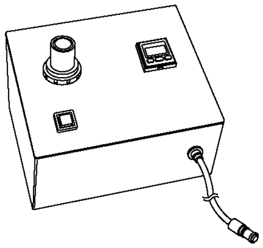
The following Service Fixture and tools are used for checking and servicing this unit.

Related to waterproof

Waterproof packing kit (For waterproof packing replacement) **VUMG1978**

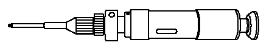


Air-leak test jig (For Waterproof property test) **RFKZ0528**



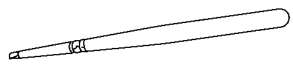
Part No.	Usage	Spec.	Remarks
RFKZ0536	DC/banana conversion cable	For power supply	Optional goods (1 piece supplied with RFKZ0528)
RFKZ0533	Vacuum pad (2 included)	For power supply	Optional goods (1 piece supplied with RFKZ0528)
RFKZ0537	Air-leak test tube (without pad)	For air-leak test	Optional goods (1 piece supplied with RFKZ0528)

Torque driver **RFKZ0542**



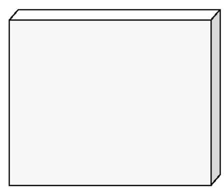
(For tightening screws with the torque)
RFKZ0456 (Shorter shank version) may be used.

Silicon chips **RFKZ0478**

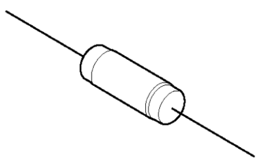


(For replacing the packings/ For prevention sticking of dust when replacing the packings)

Diffuser **RFKZ0591**

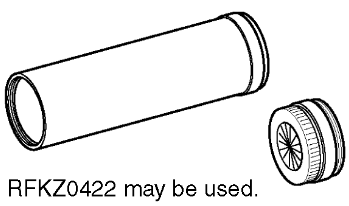


Resistor for Discharging (1k Ω/5W) **ERG5SJ102**



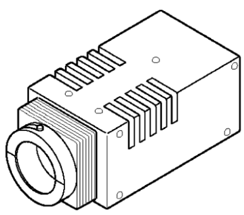
An equivalent type of Resistor may be used.

COLLIMATOR (with Focus Chart) **VFK1164TCM02**



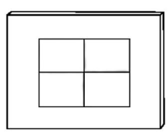
※ RFKZ0422 may be used.
※ VFK1164TCM03 may be used.

LIGHT BOX (with DC Cable) **VFK1164TDVLB**



※ RFKZ0523 may be used.

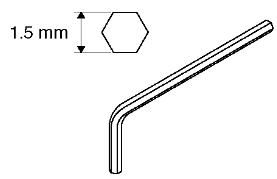
TR Chart **RFKZ0443**



Lens Cleaning Kit **VFK1900BK**



Hex Wrench (Please purchase it, locally)



8.2. When Replacing the Main P.C.B.

After replacing the Main P.C.B., be sure to achieve adjustment.
The Maintenance software (DIAS) is available at "software download" on the "Support Information from NWBG/VDBG-AVC" web-site in "TSN system".

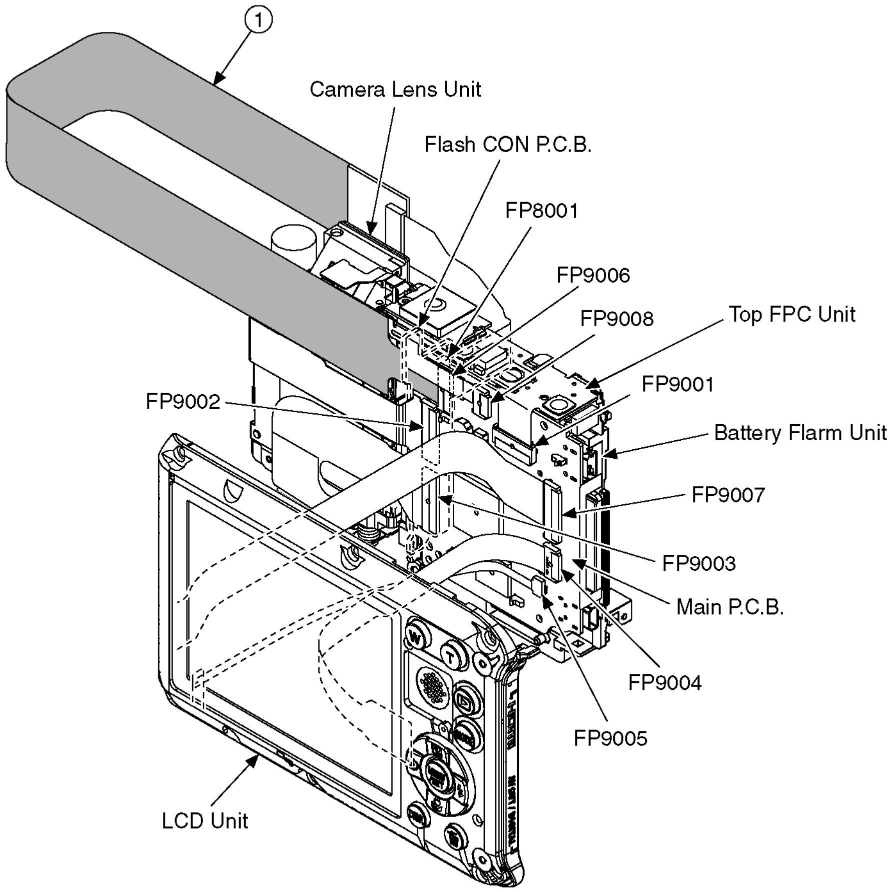
8.3. Service Position

This Service Position is used for checking and replacing parts. Use the following Extension cables for servicing.

Table S1 Extension Cable List

No.	Parts No.	Connection	Form
1	RFKZ0549	FP9006 (Main P.C.B.) - FP8001 (Flash CON P.C.B.)	18PIN 0.5 FFC

8.3.1. Extension Cable Connections



CAUTION-1. (When servicing Flash CON P.C.B.)

1. Be sure to discharge the capacitor on Flash CON P.C.B.
   Refer to "HOW TO DISCHARGE THE CAPACITOR ON FLASH CON P.C.B.".
   The capacitor voltage is not lowered soon even if the AC Cord is unplugged or the battery is removed.
2. Be careful of the high voltage circuit on Flash CON P.C.B.
3. DO NOT allow other parts to touch the high voltage circuit on Flash CON P.C.B.

9 Disassembly and Assembly Instructions

9.1. Disassembly Flow Chart

- Make sure to perform air-leak test (refer to "7.1. Service and Check Procedures" before disassembly and after assembly for check of waterproof property.
- Do not touch the waterproof packings directly by the hand.
- Do not perform cleaning of waterproof packings by the solvent of alcohol etc. or by blowing air .
- Take care not to put any foreign object (garbage and dust).
- When replacing the case O-ring, use Silicon chips (RFKZ0478).
- When tightening screws, follow the specifications when the torque is specified .

1 Side Ornament (R)
↓
2 Front Aluminum Case
↓
3 Rear Aluminum Case
↓
4 Rear Case Unit
↓ (branches to 5 and 14)

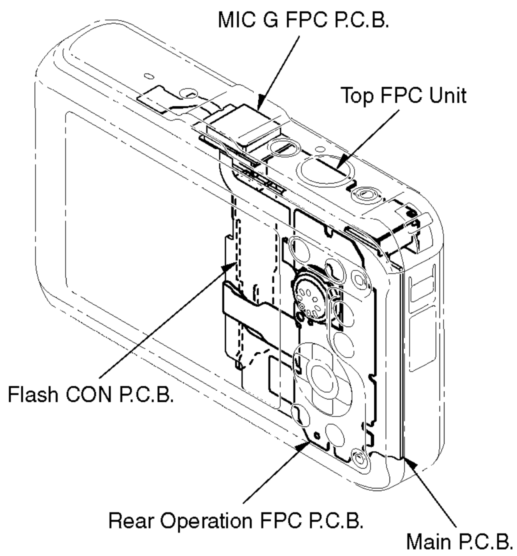
5 Lens Unit (with CCD)
↓
6 Main P.C.B.
↓
7 Top Ornament
↓
8 Top Button Plate, Top Button Packing
↓
9 Battery Frame Unit
↓ (branches to 10 and 13)

10 Top FPC Unit
↓
11 Flash CON P.C.B.
↓
12 Battery Door Unit (Battery Door Packing)

14 Rear Operation FPC P.C.B.
↓
15 LCD Unit

13 MIC G FPC P.C.B.

9.2. P.C.B. Location



9.3. Disassembly Procedures

No.	Item	Fig.	Removal
1	Side Ornament (R)	Fig. D1	SD Card
			Battery
			2 Screws (A)
			Side Ornament (R)
2	Front Aluminum Case	Fig. D2	2 Hex. Screws (B)
			2 Screws (C)
			Front Aluminum Case
3	Rear Aluminum Case	Fig. D3	2 Hex. Screws (D)
			1 Screw (E)
			Rear Aluminum Case
4	Rear Case Unit	Fig. D4	6 Screws (F)
			FP9004 (Flex)
			FP9005 (Flex)
			FP9007 (Flex)
			Rear Case Unit
		Fig. D5	Note: When attaching the Rear case Unit
5	Lens Unit (with CCD)	Fig. D6	1 Screw (G)
			2 Screws (H)
			1 Screw (I)
			1 Screw (J)
			FP9002 (Flex)
			FP9003 (Flex)
			1 Screw O-ring
			Lens Plate
			Lens Unit (with CCD)
6	Main P.C.B.	Fig. D7	2 Screws (K)
			FP9001 (Flex)
			FP9006 (Flex)
			FP9008 (Flex)
			DPR Sheet (Large)
			DPR Sheet (Small)
			Main P.C.B.
7	Top Ornament	Fig. D8	1 Screw (L)
			1 Locking tab (A)
			1 Locking tab (B)
			Top Earth Plate
			Top Ornament
8	Top Button Plate/Top Button Packing	Fig. D9	2 Screws (M)
			Top Button Plate
			Top Button Packing
9	Battery Frame Unit	Fig. D10	1 Screw (N)
			1 Screw O-ring
			Battery Frame Unit
10	Top FPC Unit	Fig. D11	2 Screws (O)
			Top FPC Unit
11	Flash CON P.C.B.	Fig. D12	1 Screw (P)
			2 Locking tabs
			FL Earth Plate
			Flash CON P.C.B.
12	Battery Door Unit (Battery Door Packing)	Fig. D13	2 Screws (Q)
			Battery shaft
			Battery Door Spring
			Battery Door Unit (Battery Door Packing)
13	MIC G FPC P.C.B.	Fig. D14	2 Screws (R)
			1 Screw (S)
			2 Screw O-rings
			GPS FPC Plate
			GPS Module
			MIC G FPC P.C.B.
14	Rear Operation FPC P.C.B.	Fig. D15	10 Screws (T)
			Rear FPC Plate
		Fig. D16	Rear Button Unit
			Rear Operation FPC P.C.B.
15	LCD Unit	Fig. D17	4 Screws (U)
			LCD Unit

9.3.1. Removal of Side Ornament (R)

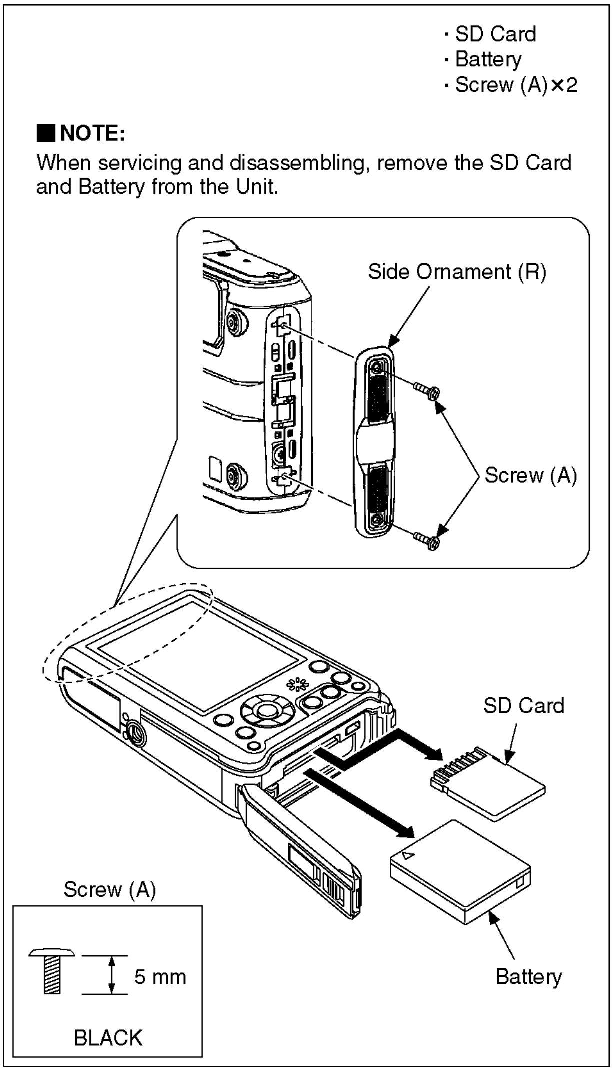
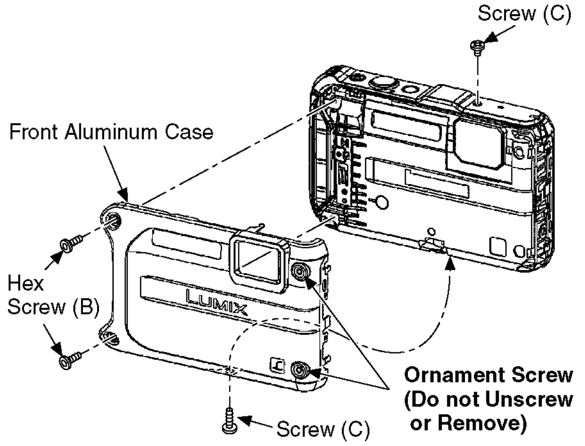


Fig. D1

9.3.2. Removal of Front Aluminum Case

- Hex Screw (B) × 2
- Screw (C) × 2



- Hex Screw (B)
  When removing/
  attaching Screw (B),
  use Hex Wrench (1.5 mm).

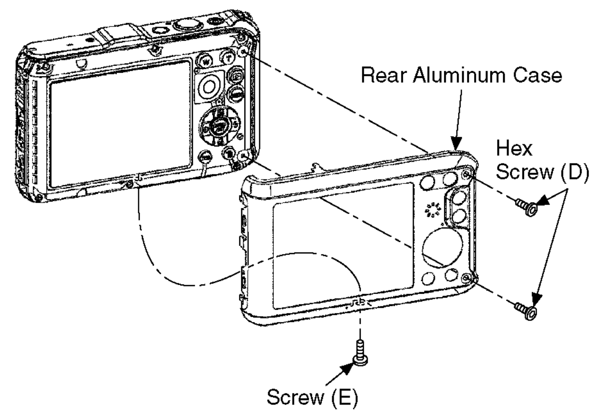
Hex Screw (1.5 mm): 3.5 mm, SILVER

Screw (C): 4 mm, BLACK

Fig. D2

9.3.3. Removal of Rear Aluminum Case

- Hex Screw (D) × 2
- Screw (E) × 1



- Hex Screw (D)
  When removing/
  attaching Screw (D),
  use Hex Wrench (1.5 mm).

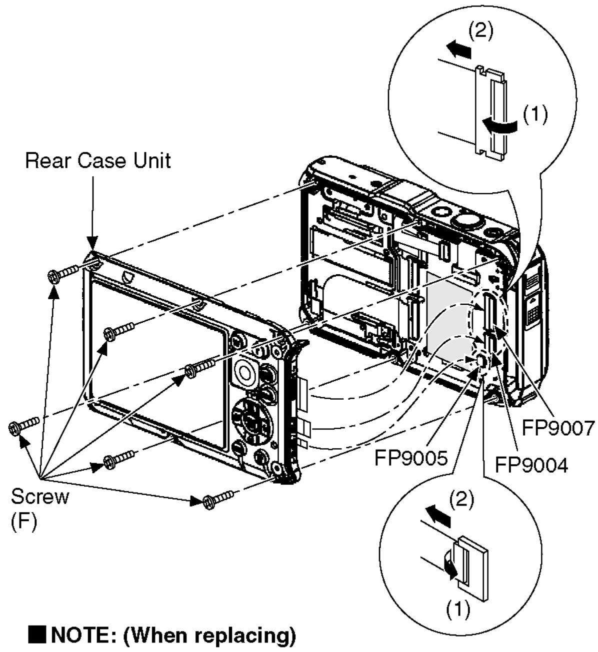
Hex Screw (1.5 mm): 3.5 mm, SILVER

Screw (E): 4 mm, BLACK

Fig. D3

9.3.4. Removal of Rear Case Unit

- Screw (F) × 6
- FP9004 (Flex)
- FP9005 (Flex)
- FP9007 (Flex)



■ **NOTE: (When replacing)**

- When tightening Screw, follow the contents in figure D5.
- When removing the flex, pull up the locking Tab in the direction of arrow (1), then remove the flex in the direction of arrow (2).

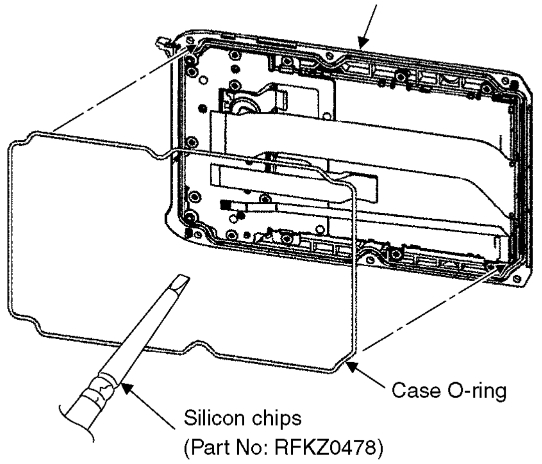
Screw (F): 6 mm, SILVER

Fig. D4

SCREW TIGHTENING NOTE: TAPE/ORDER/TORQUE

■ **NOTE: (When attaching the rear case unit)**

- Do not insert the Flex from any slanted angle.
- Make sure the connector is firmly locked.
- When attaching case O-ring, use Silicon chips (Part No. : RFKZ0478).
- Make sure the O-ring of rear case dose not come off.
- Make sure foreign objects are not attached to the O-ring the waterproof lib of the front case.
- When tighten the screws, use Torque screwdriver (Part No. RFKZ0542) and tighten by the specified torque.
- Tighten the screws in the order of (1) to (6) as shown below.
- To keep waterproof property, not to be stripped thread or stuffed thread.



< Order of tightening screws/ tightening torque >

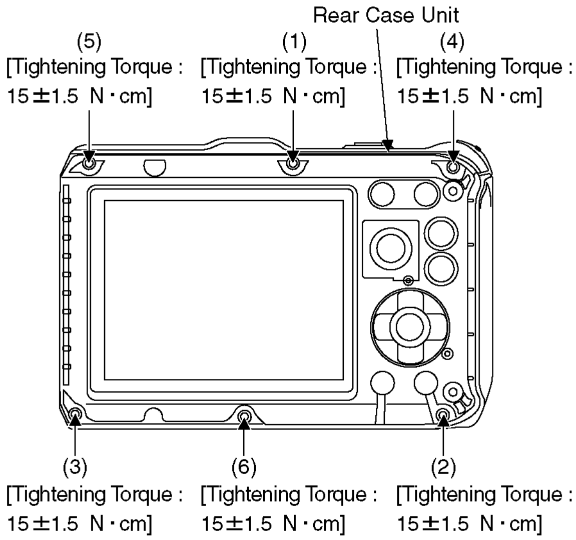


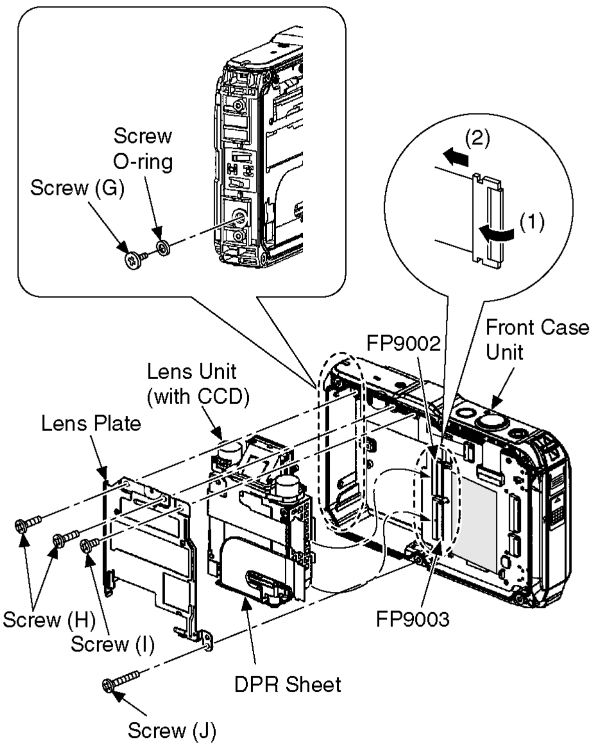
Fig. D5

9.3.5. Removal of Lens Unit (with CCD)

Note: (When Disassembling/Assembling)

1. When dust stuck, use air-Blower to blow off the dust.
2. Do not touch the surface of lens by your hand.
3. Use Lens Cleaning KIT; VFK1900BK (Only supplied as 10 set/Box) is available as Service Aid.

・Screw (G) ×1 ・FP9002 (Flex)
・Screw (H) ×2 ・FP9003 (Flex)
・Screw (I) ×1 ・Screw O-ring
・Screw (J) ×1 ・Lens Plate



■ **Note: (When replacing)**

- When removing the flex, pull up the locking tab in the direction of arrow (1), and then remove the flex in the direction of arrow (2).
- When attaching Lens Plate, Note cutting of Flex.
- Do not insert the Flex from any slanted angle. Insert the Flex fully.
- Make sure the connector is firmly locked.
- Make sure that sheet Lens Plate in front of Lens is locked to concave of Front Case Unit , because the focus of the Lens might be not suitable.
- As for attaching position of DPR Sheet, refer to the above sketch.

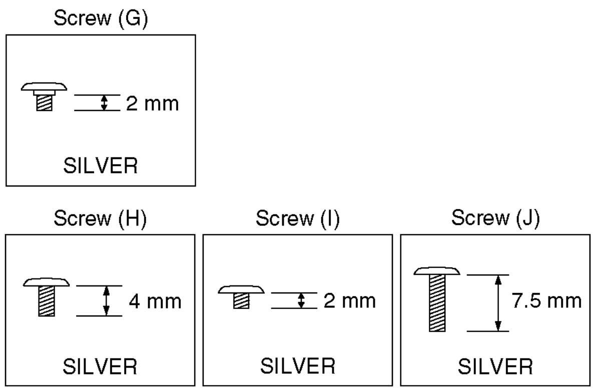
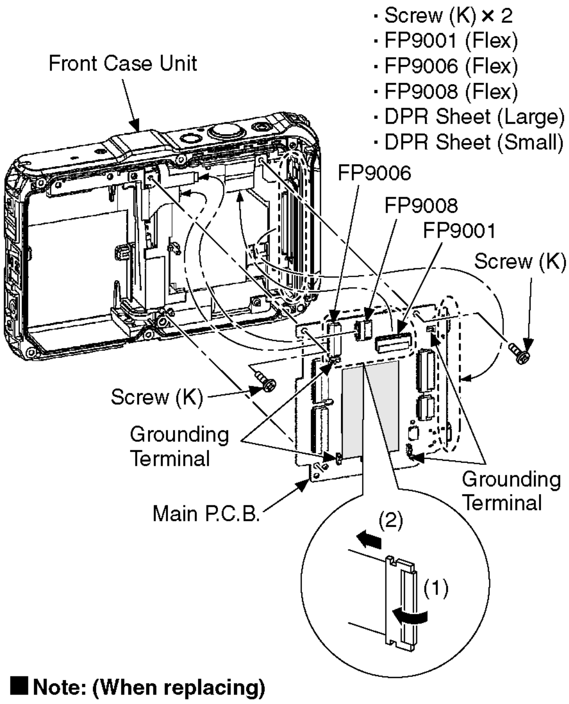


Fig. D6

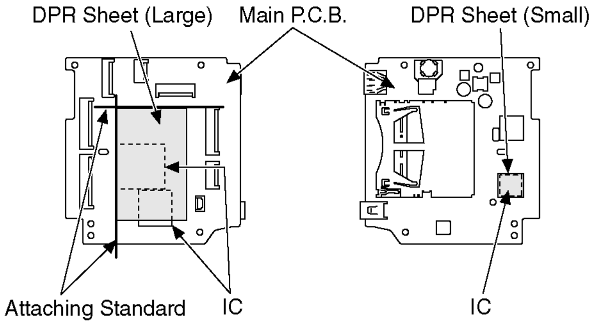
9.3.6. Removal of Main P.C.B.



■ **Note: (When replacing)**

- When removing the flex, pull up the locking tab in the direction of arrow (1), and then remove the flex in the direction of arrow (2).
- Make sure the connector is firmly locked.
- Do not insert the Flex from any slanted angle. Flex is inserted fully.
- Do not touch the Ground Terminals. (Take care not to dirt or transformation.)

※ As for attaching position of DPR Sheet (Large/Small), refer to the following sketch.



Screw (K)

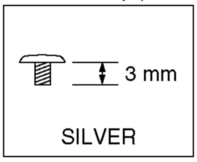
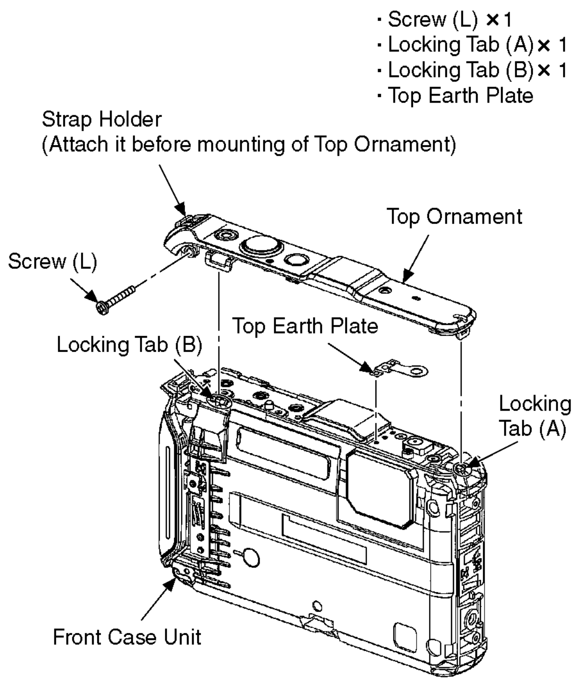


Fig. D7

9.3.7. Removal of Top Ornament



■ **Note: (When attaching)**

- Be careful about mounting position of Top Earth Plate.
- Attach the Tabs in order of (A) to (B) as shown above sketch.

Screw (L)

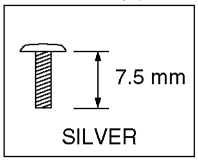
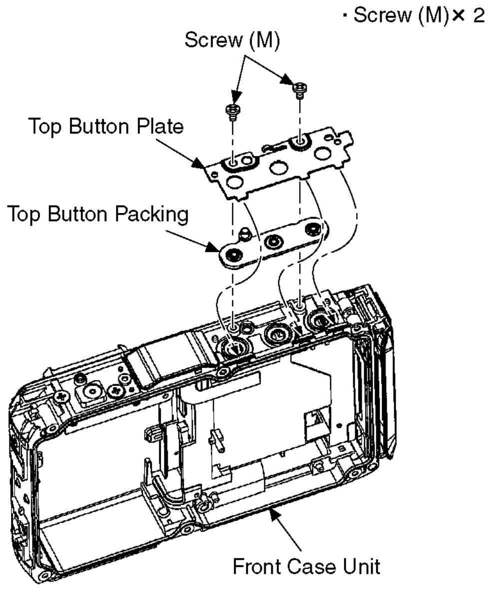


Fig. D8

9.3.8. Removal of Top Button Plate/Top Button Packing

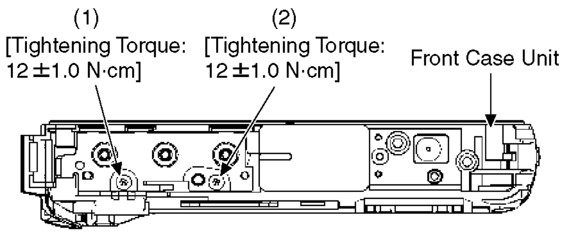
SCREW TIGHTENING NOTE: TORQUE



■ **Note: (When attaching)**

- Make sure the 3-grooves of Top Button Packing should be mounted to the 3 waterproof libs of the Front Case Unit firmly.
- Make sure foreign objects are not attached to the Top Button Packing and Front Case Unit.
- Take Care not to damage the grooves and waterproof libs.

<Order of tightening screws/ tightening torque>



Screw (M)

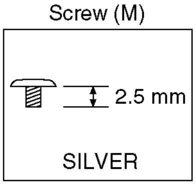
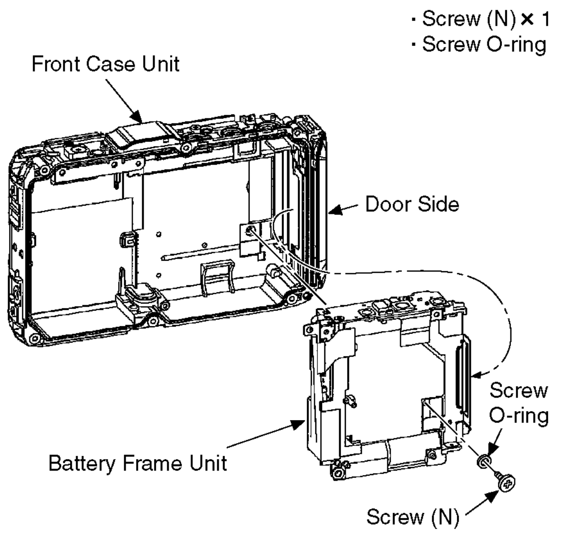


Fig. D9

9.3.9. Removal of Battery Frame Unit



■ **Note: (When attaching)**

- When attaching Battery frame Unit, insert the Door Side first.
- Take Care of Damaging Breaking down and dragging of FPC.
- Attach the Battery Case Unit without Top Button packing, Top Button Plate.

Screw (N)

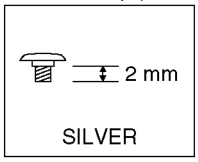


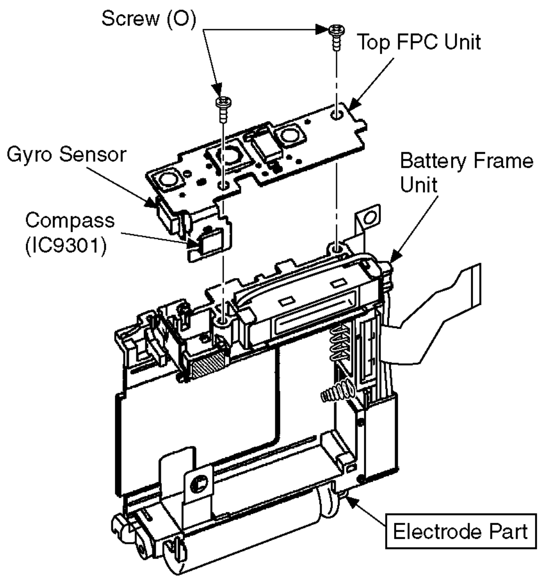
Fig. D10

9.3.10. Removal of Top FPC Unit

· Screw (O) × 2

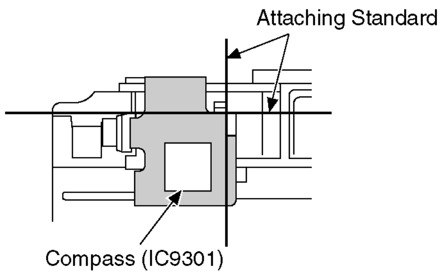
< ⚠ CAUTION >

To avoid electric shock, do not touch the Electrode Part of the flash condenser when removing the Battery Frame Unit.



■ **Note: (When attaching Compass)**

When assembling, follow the atlaching standard.



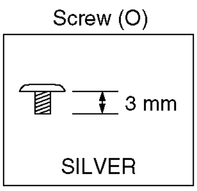
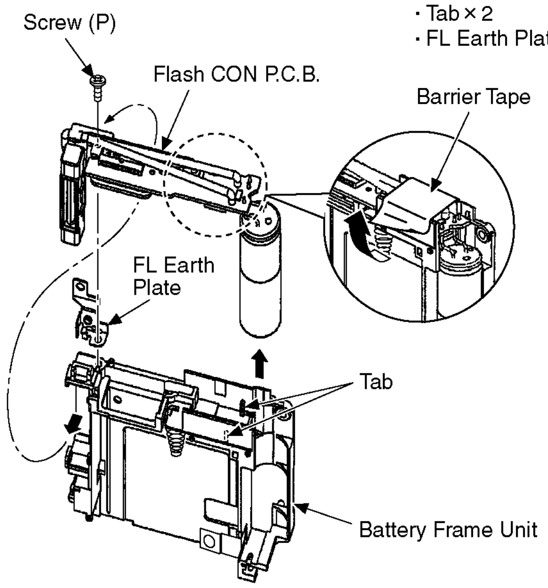


Fig. D11

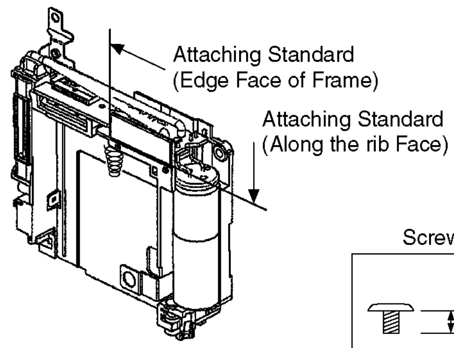
9.3.11. Removal of Flash CON P.C.B.

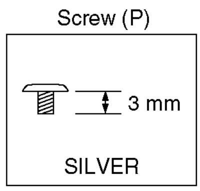
· Screw (P) × 1
· Tab × 2
· FL Earth Plate



■ **Note: (When replacing)**

- When assembling, replacing and attaching of Barrier Tape to the Battery Frame Unit, confirm the attaching position, and then attach.





< ⚠ CAUTION >

To avoid electric shock, follow the procedure below to be sure to discharge the capacitor on Flash CON P.C.B.

[Discharging Procedure]

1. Put the insulation tube onto the lead part of Resistor (ERG5SJ102:1kΩ/5W).
2. Put the resistor between both terminals of capacitor on Flash P.C.B. for approx. 5 seconds.
3. Discharge completion.

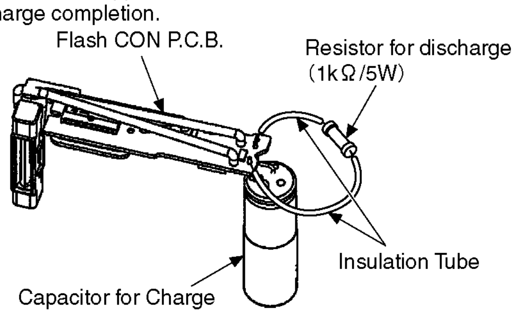
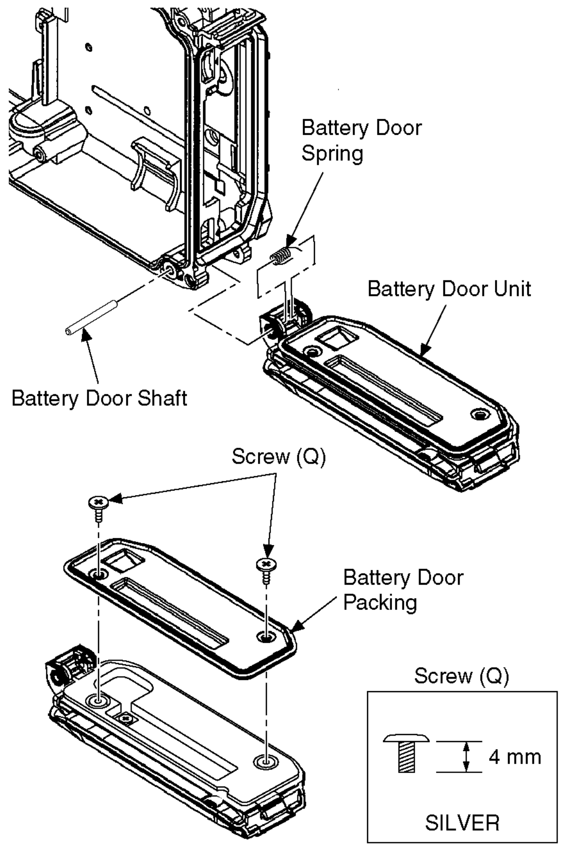


Fig. D12

9.3.12. Removal of Battery Door Unit (Battery Door Packing)

SCREW TIGHTENING NOTE: ORDER/TORQUE

- Screw (Q) × 2
- Battery Door Shaft
- Battery Door Spring



<Order of tightening screws/ tightening torque>

(1)-(2) : [Tightening Torque: 8 ± 1 N·cm]

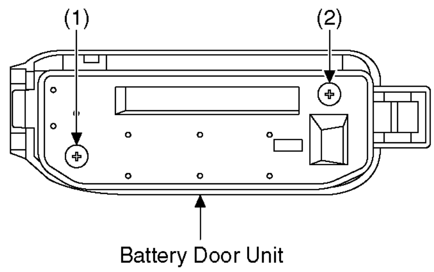
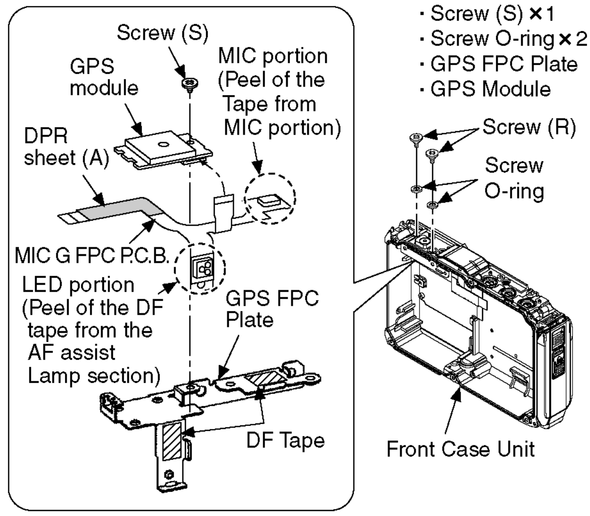


Fig. D13

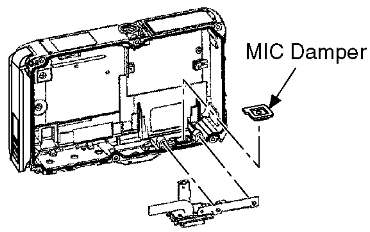
9.3.13. Removal of MIC G FPC P.C.B.

- Screw (R) × 2
- Screw (S) × 1
- Screw O-ring × 2
- GPS FPC Plate
- GPS Module

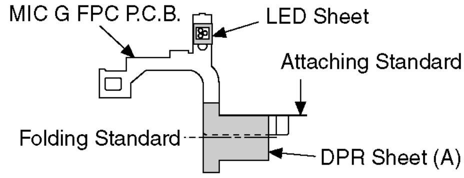


■ **Note: (When Replacing)**

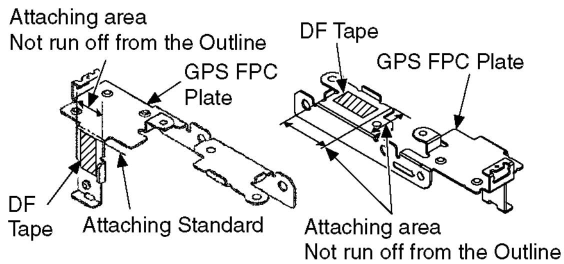
1. • Make sure that the waterproof lib of Front Case Unit is securely inserted in the groove of MIC Damper.
   • Avoid catching foreign objects between the Front Case Unit and MIC Damper.
   • Note that the MIC Damper has a direction.



2. • Check the attaching position of LED Sheet.
   • Hold the DPR Sheet (A) to wrap the double side of MIC G FPC P.C.B. and adhere it.



3. • When assembling, replacing and attaching of DF Tape to the GPS FPC plate, confirm the attaching position, and then attach.



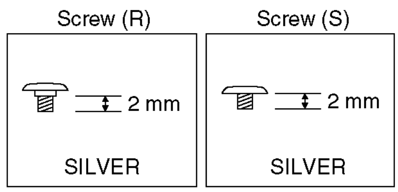
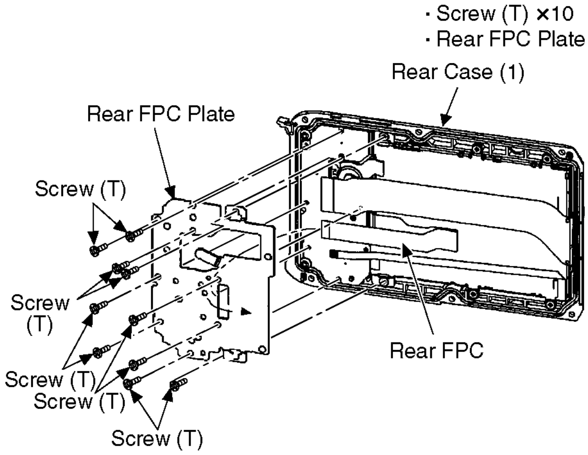


Fig. D14

9.3.14. Removal of Rear Operation FPC P.C.B.

SCREW TIGHTENING NOTE: TORQUE

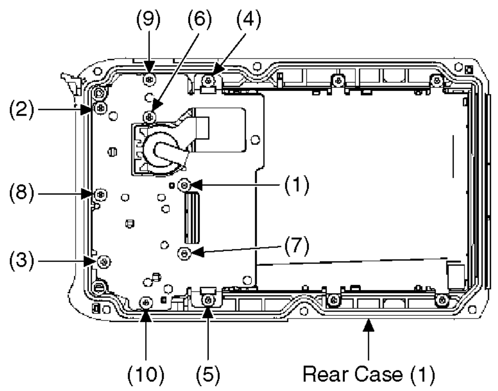


■ **Note: (When attaching)**

- Pass the REAR FPC through the hole of Rear FPC Plate (above).
- If the Rear FPC Plate is floating, screws tend to become loose.
  Avoid floating of Rear FPC Plate when tightening screws.

<Order of tightening screws/ tightening torque>

(1)-(10) : [Tightening Torque : 12±1.0 N·cm]



Screw (T)

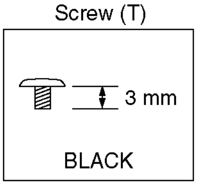
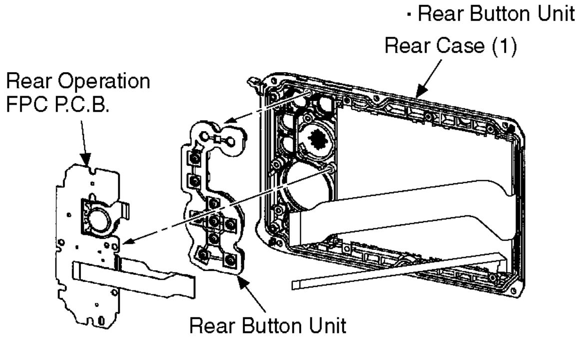
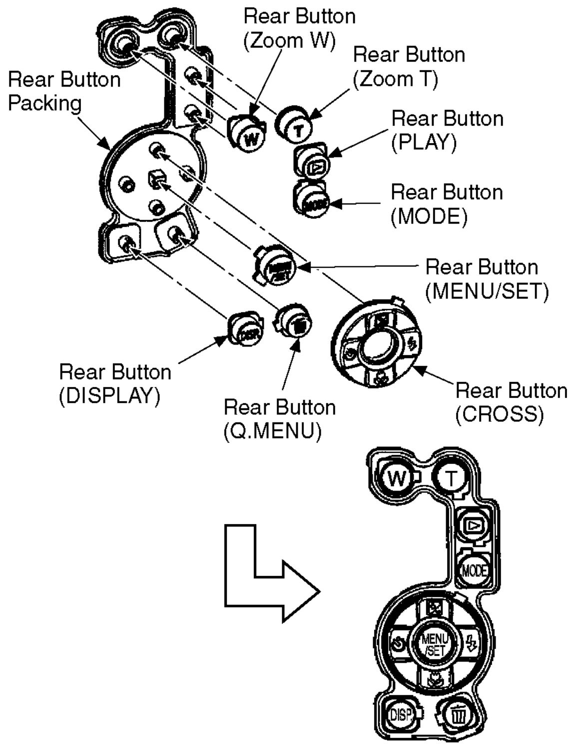


Fig. D15



■ **Note: (When attaching Rear Buttons)**

- Make sure that each Rear Button Pin is securely inserted into the screw holes of Rear Button Packing.
- Note that the Rear Button has a direction.
- Make sure that the Waterproof Lib of Rear Case is securely inserted in the groove of Rear Button Packing.
- Avoid catching foreign objects between the Rear Button Packing and the Rear Case (1).



■ **Note: (When attaching of Rear Operation FPC P.C.B.)**

1. Follow the below sketch (1) and (2).
2. When removing the speaker, take care not to breaking down of solder portion.

1. Arrange the Rear Operation FPC P.C.B.
2. Attaching of Speaker

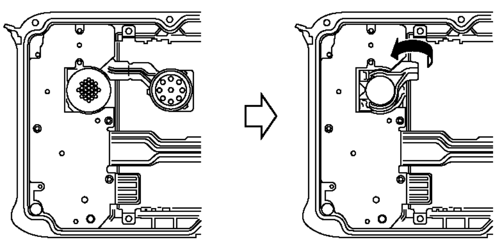
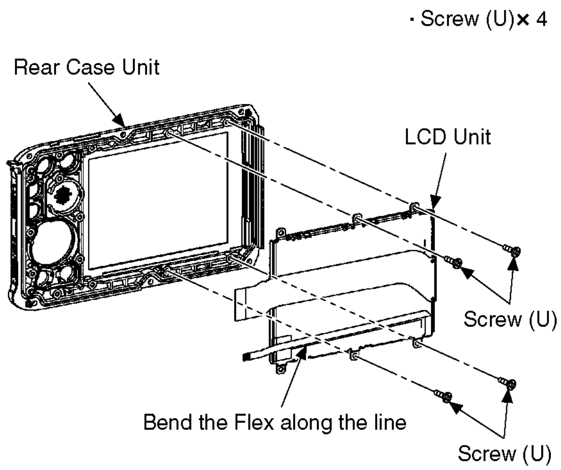


Fig. D16

9.3.15. Removal of LCD Unit



■ **Note: (When attaching)**

If the LCD Unit is floating, screws fend to become loose.
Avoid floating of LCD Unit when tightening screws.

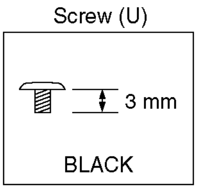


Fig. D17

10 Measurements and Adjustments

10.1. Introduction

When servicing this unit, make sure to perform the adjustments necessary based on the part(s) replaced.
Before disassembling the unit, it is recommended to back up the camera data stored in flash-rom as a data file.

IMPORTANT NOTICE (After replacing the Main P.C.B.)

After replacing the Main P.C.B., it is necessary to use the "DIAS" software to allow the release of adjustment flag(s).
The Adjustment software "DIAS" is available at "TSN Website". To download, click on "Support Information from NWBG/VDBG-AVC".
*DIAS (DSC Integrated Assist Software)

10.2. Before Disassembling the unit

10.2.1. Initial Setting Release

The cameras specification are initially set in accordance with model suffix (such as EB, EG, GC, and so on.).
Unless the initial setting is not released, an automatic alignment software in the camera is not able to be executed when the alignment is carried out.

Note:

The initial setting should be again done after completing the alignment. Otherwise, the camera may not work properly.
Therefore as a warning, the camera display a warning symbol " ! " on the LCD monitor every time the camera is turned off.
Refer to the procedure described in "3.7.2. INITIAL SETTINGS" for details.

[How to Release the camera initial setting]
Preparation:

Attach the Battery to the unit.
Set to P(Program AE) mode by operating the mode button.

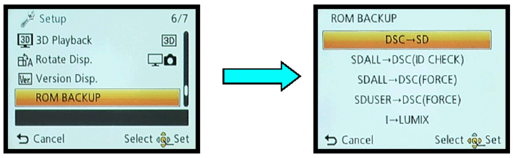
Step 1. Temporary cancellation of "INITIAL SETTINGS":
While pressing the UP of Cursor button and MOTION PICTURE button simultaneously, turn the Power on.
Step 2. Cancellation of "INITIAL SETTINGS":
Press the PLAYBACK switch.
While pressing UP of Cursor button and MOTION PICTURE button simultaneously, turn the Power off. (The warning symbol " ! " is displayed on the LCD monitor.)

10.2.2. Flash-Rom Data Backup

When trouble occurs, it is recommended to backup the Flash-rom data before disassembling the unit.
There are two kinds of Flash-rom data backup methods:

[ROM_BACKUP (Method of Non-PC backup)]

1. Insert the SD-card into the camera.
2. Set the camera to "Temporary cancellation of the initial settings".
3. Select the "SETUP" menu.
   From the "SETUP" menu, select "ROM BACKUP".
   Note:
   This item is not listed on the customer's "SET UP" menu.
4. When this "ROM_BACKUP" item is selected, the following submenus are displayed.

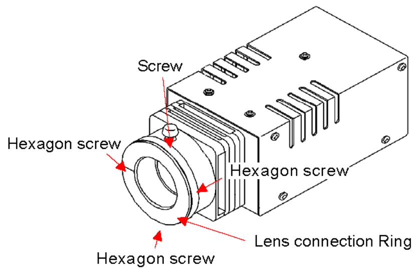


Item	Function	Details
DSC → SD	Save all the DSC's Flash-rom data to SD-CARD	・DSC's Flash-rom data is saved to the SD-CARD as a data file by the same format as the TATSUJIN software for the previous models. (DATA BACKUP) -File location: ROOT DIRECTORY in SD-CARD. -File Name: 1) User Setup Information data: <Model Number>U.txt [Example: DMC-FX66 : "FX66U.txt"] 2) Optical Adjustment data: <Model Number>F.txt [Example: DMC-FX66 : "FX66F.txt"] ・If the concerned file already exists, "OVERWRITE?" message is displayed.
SDALL→ DSC (ID CHECK)	Write the all data to DSC's Flash-rom from SD-CARD	・The backup data being stored in the SD card is transferred to DSC unit. ・ID CHECK: When the model ID is different, data is not transferred. ・FORCE: Even if the model ID is different, data is transferred. * If the main PCB is replaced, select "SDALL→DSC(FORCE)".
SDALL → DSC (FORCE)	Write the all data to DSC's Flash-rom from SD-CARD	
SDUSER → DSC (FORCE)	Only "User setup information" is written from the saved file in the SD-CARD to DSC's Flash-rom.	・Only the user's "setup" setting condition is transferred to DSC unit. ・FORCE: Even if the model ID is different, the data is transferred.
! → LUMIX	Shipping set without initializing "User setup information"	・Initial setting is executed without initializing the user's set up setting condition. * The initial setting must be perform while the Self-timer LED is blinking, * The picture data stored in the built-in memory of the DSC is not erased, with this operation.

[DSC Integrated Assist Software (Method of Using PC)]
Same as TATSUJIN software for previous models.

10.2.3. Light Box

If using VFK1164TDVLB Light Box, remove the lens connection ring by loosing three hexagon screws.



10.3. Details of Electrical Adjustment

10.3.1. How to execute the Electrical Adjustment

It is not necessary to connect the camera to a PC to perform adjustments.
"Flag reset operation" and "Initial setting operation" are required when carrying out the alignment, follow the procedure below.

10.3.1.1. Startup Electrical Adjustment mode

1. Release the initial settings.
2. Insert a recordable SD card.
   (Without a SD card, the automatic adjustment can not executed.)
3. Procedure to set the camera into adjustment mode:
   a. Set to P(Program AE) mode by operating the mode button.
   b. Turn the Power off.
   c. Turn the Power on pressing MOTION PICTURE and MENU/SET simultaneously.
   LCD monitor displays "SERVICE MODE".
   (Refer to Fig.F3-1)

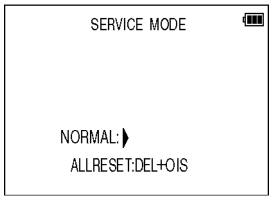


Fig. 3-1

10.3.1.2. Status Adjustment Flag Setting

Reset (Not yet adjusted) the status flag condition.

1. After pressing the DISPLAY button, the LCD monitor displays the Flag status screen (Refer to Fig.3-2.)
2. Select item by pressing the cross keys. (Gray cursor is moved accordingly.)
3. Press the DELETE button.
   Note:
   The selected item's flag has been changed from "F (green)" to "0 (yellow)".
   *(Refer to Fig. 3-3)
   *Flag conditions:
   F (green)
   means that the alignment has been completed and the status flag condition is set. In this case, the flag condition should be reset, if you try to carry out the automatic alignment.
   0 (yellow)
   means that the alignment has been not "completed" and the status flag condition is "reset". In this case, automatic alignment is available.

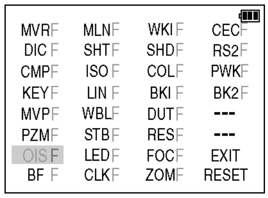


Fig. 3-2

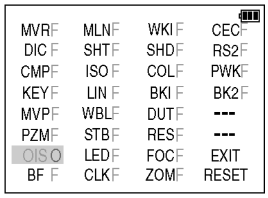


Fig. 3-3
< Example: OIS flag is reset. >

- In case of setting the status flag into set condition again without completion of the alignment, the status flag should be SET by using PC, or UNDO by using ROM BACKUP function.

10.3.1.3. Execute Adjustment

1. Perform step "10.3.1.1." to "10.3.1.2.", to reset the OIS flag status "F" (Set) to "0" (Reset).
2. Press DISPLAY button after Flag reset.
   OIS Adjustment screen is displayed on the LCD panel. (Refer to Fig.3-4)
3. Press the shutter button. The adjustment will start automatically.
4. When the adjustment is completed successfully, adjustment report menu appears with Green OK on the LCD monitor. (Refer to Fig.3-5)

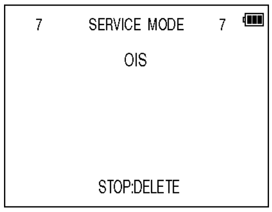


Fig. 3-4

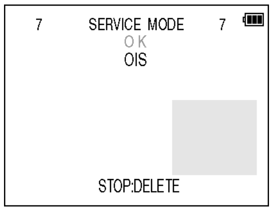


Fig. 3-5

10.3.1.4. Attention point during Adjustment

1. Step "10.3.1.3." procedure shows OIS adjustment as an example. To perform the adjustment, refer to the "10.3.2. Adjustment Specifications" table which shows key point for each adjustment.
2. Do not move the light box, the camera or the chart while adjusting. If one of these is moved accidentally, start the adjustment again.
3. Do not press any buttons/keys until the default menu (Fig.3-6) is displayed on the LCD monitor. Otherwise, adjustment data may not be stored properly.
4. If the adjustment is interrupted accidentally, the alignment data may not be properly saved in the Flash-rom.

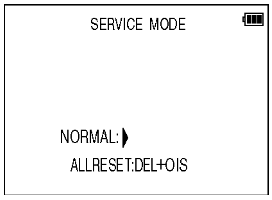


Fig. 3-6

10.3.1.5. Finalizing the Adjustment

1. Several adjustment flags can be reset ("F" into "0") at the same time. In this case, when the adjustment has been completed, the screen will change showing the adjustment for the next item until all reset items are completed.
   Also, when the shutter button is pressed, the screen jump to the next adjustment item.
2. To cancel the adjustment mode while in the process of performing the adjustment, follow this procedures.
   (1) Press "Right of cross key" button.
   Note:
   *.If adjustment is cancelled with above procedure, adjustment is not completed. Make sure to adjust it later.
   *.Adjustment software "DIAS" is able to control the status of the adjustment flags.

10.3.2. Adjustment Specifications

The following matrix table shows the relation between the replaced part and the Necessary Adjustment.
When a part is replaced, make sure to perform the necessary adjustment(s) in the order indicated.
The table below shows all the information necessary to perform each adjustment.

Adjustment order	Adjustment Item	FLAG	Purpose	Replacing Parts: MAIN PCB/ VENUS ENGINE (IC6001)/ F-ROM (IC6002)	Replacing Parts: Lens Parts (Include CCD U)	Replacing Parts: MIC UNIT	Replacing Parts: FLASH UNIT	JIG/TOOLS	SET UP	How to Operate
1	Venus Zoom	PZM	Venus Zoom Inspection	○	–	–	–	NONE	NONE	1)Press Shutter Button 2)After completed, the "OK" menu appears.
2	OIS sensor	OIS	OIS sensor output level adjustment	○	○	–	–	NONE	NONE	1)Press Shutter Button (Do not apply any shock and vibration for the camera while adjusting) 2)After completed, the "OK" menu appears.
3	Backfocus / GYRO	BF	To have the focus tracking curve be appropriate shape and GYRO sensor adjustment	○	○	–	–	・COLLIMATOR (VFK1164TCM02 or VFK1164TCM03 or RFKZ0422)	1)Set the camera in front of collimator so that the distance from collimator to camera becomes about 1 cm as shown in Fig.A. 2)Set the camera angle so that the center of the chart comes to the center of the LCD monitor. 【IMPORTANT】 The adjustment "NG" might be happened with the following conditions: - Do not put the black colored stuff at the back side of collimator near hunching chart. It needs to get some certain brightness. - Make sure the hunching chart has no dust and dirty condition. - Do not connect a USB cable during adjustment.	1)Press Shutter Button (Do not apply any shock and vibration for the camera while adjusting) 2)After completed, the "OK" menu appears.
4	Monitor Linearity	MLN	Monitor Linearity adjustment	○	○	–	–	・LIGHT BOX (VFK1164TDVLB or RFKZ0523)	1)Set the camera in front of LIGHT BOX so that the distance from LIGHT BOX to camera becomes about 2 cm as shown in Fig.B. 2)Aim the LIGHTBOX and make the frame detail alignment so that the entire LCD screen becomes fully "white". (No dark area).	1)Press Shutter Button 2)After completed, the "OK" menu appears.
5	Shutter	SHT	Shutter speed adjustment	○	○	–	–	・LIGHT BOX (VFK1164TDVLB or RFKZ0523) ・TR CHART (RFKZ0443)	1) Insert the TR chart into the slot of LIGHT BOX. 2) Set the camera in front of LIGHT BOX so that the distance from LIGHT BOX to camera becomes about 16 cm as shown in Fig.B. 3) Set the camera angle so that the color chart is displayed on the LCD monitor fully. 【IMPORTANT】 The adjustment "NG" might be happened with the following conditions: - Since the lens position is automatically set into certain position after executing auto adjustment, confirm the angle after stopping the lens zoom position. - It is no problem even though the chart on to the LCD monitor slightly cut at the corner. - It is no problem even though the focusing slightly becomes out of focusing condition. - Not connect the USB cable at this stage.	1)Press Shutter Button 2)After completed, the "OK" menu appears.
6	ISO	ISO	ISO sensitivity adjustment	○	○	–	–			1)Press Shutter Button 2)After completed, the "OK" menu appears.
7	High brightness coloration	LIN	High brightness coloration adjustment	○	○	–	–			1)Press Shutter Button 2)After completed, the "OK" menu appears.
8	White Balance	WBL	White balance adjustment under various color temperature	○	○	–	–			1)Press Shutter Button 2)After completed, the "OK" menu appears.
9	CCD Missing Pixels (White)	WKI	Compensation of CCD Missing Pixels (White)	○	○ *1	–	–	NONE	NONE	1)Press Shutter Button 2)After completed, the "OK" menu appears.
10	Flash	STB	Flash Inspection	○	–	–	○	NONE	NONE	1)Press Shutter Button and check that Flash is emitted. (The number of emissions differs depending on the model.) If Flash is not emitted, Flash Unit may be damaged. 2)If the inspection result shows "NG", use "DIAS" and rewrite STB to confirm it is adjusted. The result may show "NG" if the inspection is performed on sites other than the specific environment (factory). However, if the flash emission is visible, there is no problem. 3)After completed, the "OK" menu appears.
11	Color reproduction inspection and Microphone check	COL	Color reproduction inspection and Microphone check	○	○	○	–	NONE	Right after pressing the shutter button, enter the continuous sounds (voice) to the microphone until lens unit starting the zooming.	1)Press Shutter Button. Right after pressing the shutter button, make a continuous sound (voice) to the microphone until lens unit starting the zooming. 2)After completed, the "OK" menu appears.
		BKI	Do not use "BKI" adjustment flag for this unit. Use "BK2" adjustment flag, instead. (In case of most DSC models, the adjustment flag for CCD Missing Pixels is "BKI". But, in this model, "BK2" the adjustment flag for CCD Missing Pixels.)							

Adjustment order	Adjustment Item	FLAG	Purpose	Replacing Parts				JIG/TOOLS	SET UP	How to Operate
				MAIN PCB/ VENUS ENGINE (IC6001)/ F-ROM (IC6002)	Lens Parts (Include CCD U)	MIC UNIT	FLASH UNIT			
12	*2 CCD Missing Pixels (Black)	BK2	Compensation of CCD Missing Pixels (Black)	O	O	−	−	・LIGHT BOX (RFKZ0523 or VFK1164TDVLB) ・DIFFUSER (RFKZ0591)	1)Prepair the LIGHTBOX (RFKZ0523). (The LIGHTBOX "VFK1164TDVLB" can be used if the front hood of VFK1164TDVLB is removed.) 2)Set the Diffuser (RFKZ0591) to the LIGHTBOX. 3)Set the LIGHTBOX and Camera unit so that distance becomes about 2 cm in Fig.B. NOTE: Do not use "BKI" adjustment flag for this unit. Use "BK2" adjustment flag, instead.	1)Set the LIGHTBOX and Camera unit so that the distance becomes about 2 cm. (Refer to Fig.B) 2)Press Shutter Button. (The green●mark is displayed on LCD). 3)Aim the LIGHTBOX and make the frame detail alignment so that the entire LCD screen becomes fully "white". (No dark area). Press the Shutter Button. 4)Press Shutter Button. (The adjustment is executed, and then green●mark is displayed on LCD). 5)Press Shutter Button. (The green●mark is displayed on LCD). 6)Press Shutter Button. (The adjustment is executed, and then green●mark is displayed on LCD). 7)Set the LIGHTBOX and Camera unit so that the distance becomes about 5.2 cm. (Refer to Fig.B) 8)Press Shutter Button. (The green●mark is displayed on LCD). 9)Press Shutter Button. (The adjustment is executed, then "OK" mark is displayed on LCD when the adjustment has been completed successfully.).

*1 : White missing pixels means that the pixel which is always active (lit) although shading(Dark) condition.
*2 : Black missing pixels means that the pixel which is always non-active (off) although high-intensity light is coming.

Fig.A

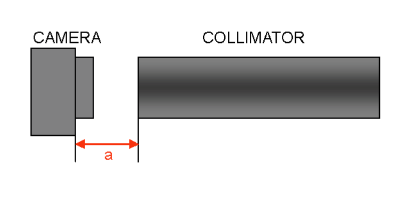


Fig.B

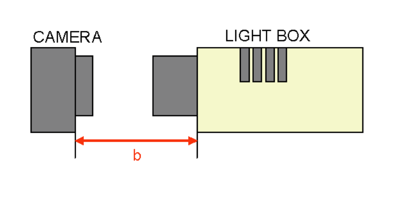
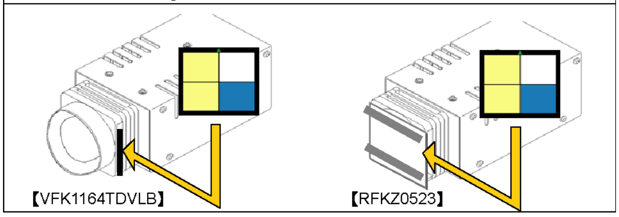


Fig.C How to Insert the TR chart into LIGHT BOX



■ **IMPORTANT NOTICE (After replacing the Main P.C.B.)**

After replacing the MAIN P.C.B., make sure to perform the "INITIAL SETTINGS" first, then release the "INITIAL SETTINGS" in order to proceed the electrical adjustment.

Note:

1. If electrical adjustment or data re-writing is executed before "INITIAL SETTINGS", suffix code list is never displayed, and it cannot be chosen suitable suffix code.
2. Never remove the battery during initial setting in process.

10.4. After Adjustment

10.4.1. Initial Setting

Since the initial setting has been released to execute the built-in adjustment software, it should be set up again before shipping the camera to the customer.
Refer to the procedure described in "3.8.2. INITIAL SETTINGS" for details.

[IMPORTANT]

1. The initial setting should be done again after completing the alignment. Otherwise, the camera will not work properly.
   Therefore as a warning, the camera display a warning symbol " ! " on the LCD monitor every time the camera is turned off.
2. Confirm that status of all adjustment flag show "F". Even if one of the adjustment flag shows "0", initial setting programmed is never executed.
3. Adjustment software "DIAS" is able to control the status of the adjustment flags.
   The Adjustment software "DIAS" is available at "TSN Website", therefore, access to "TSN Website" at "Support Information from NWBG/VDBG-AVC".

11 Maintenance

11.1. Cleaning Lens and LCD Panel

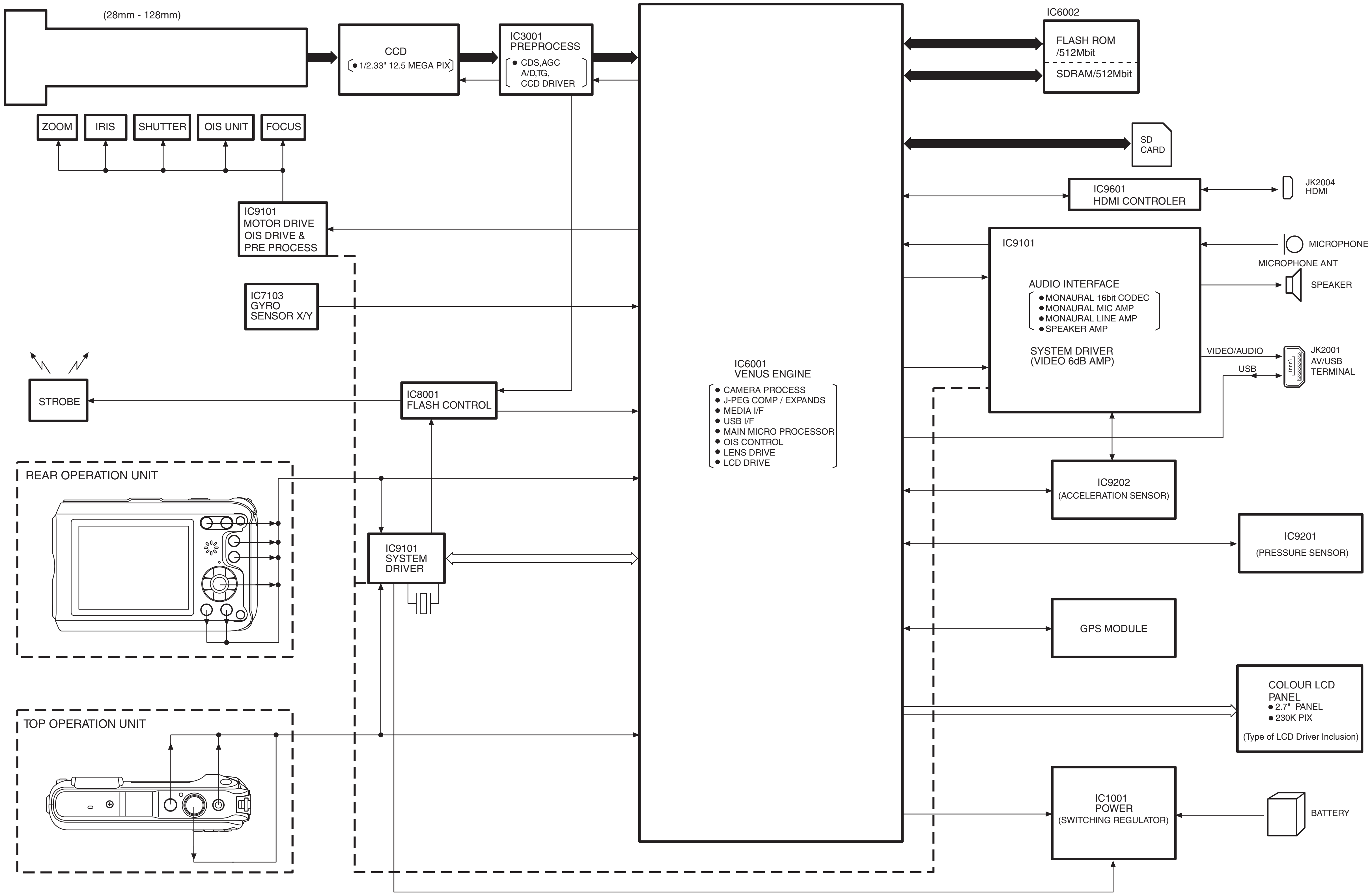
Do not touch the surface of lens and LCD Panel with your hand.
When cleaning the lens, use air-Blower to blow off the dust.
When cleaning the LCD Panel, dampen the lens cleaning paper with lens cleaner, and the gently wipe the their surface.

Note:

The Lens Cleaning KIT; VFK1900BK (Only supplied as 10 set/Box) is available as Service Aid.

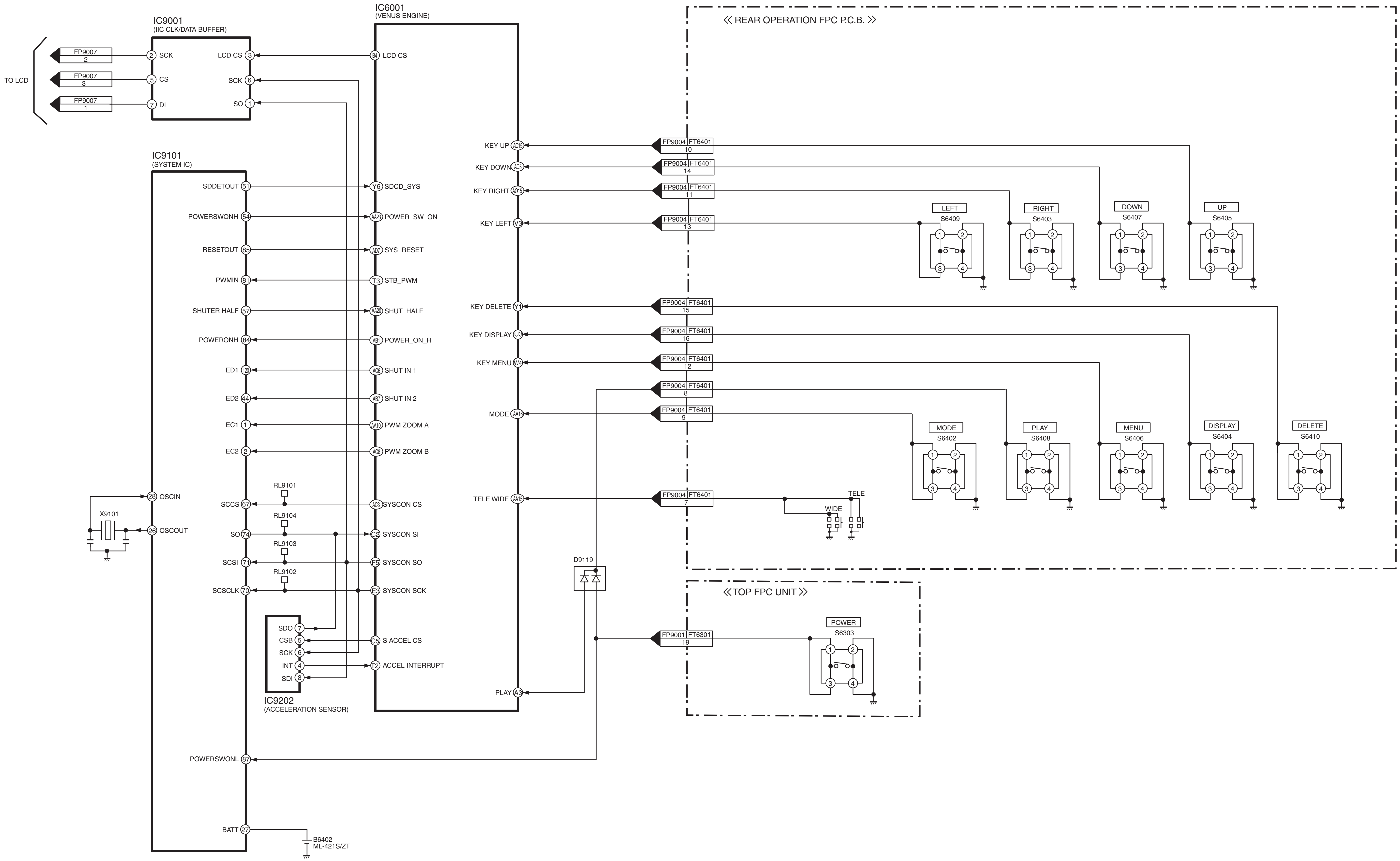
12 Block Diagram

12.1. Overall Block Diagram



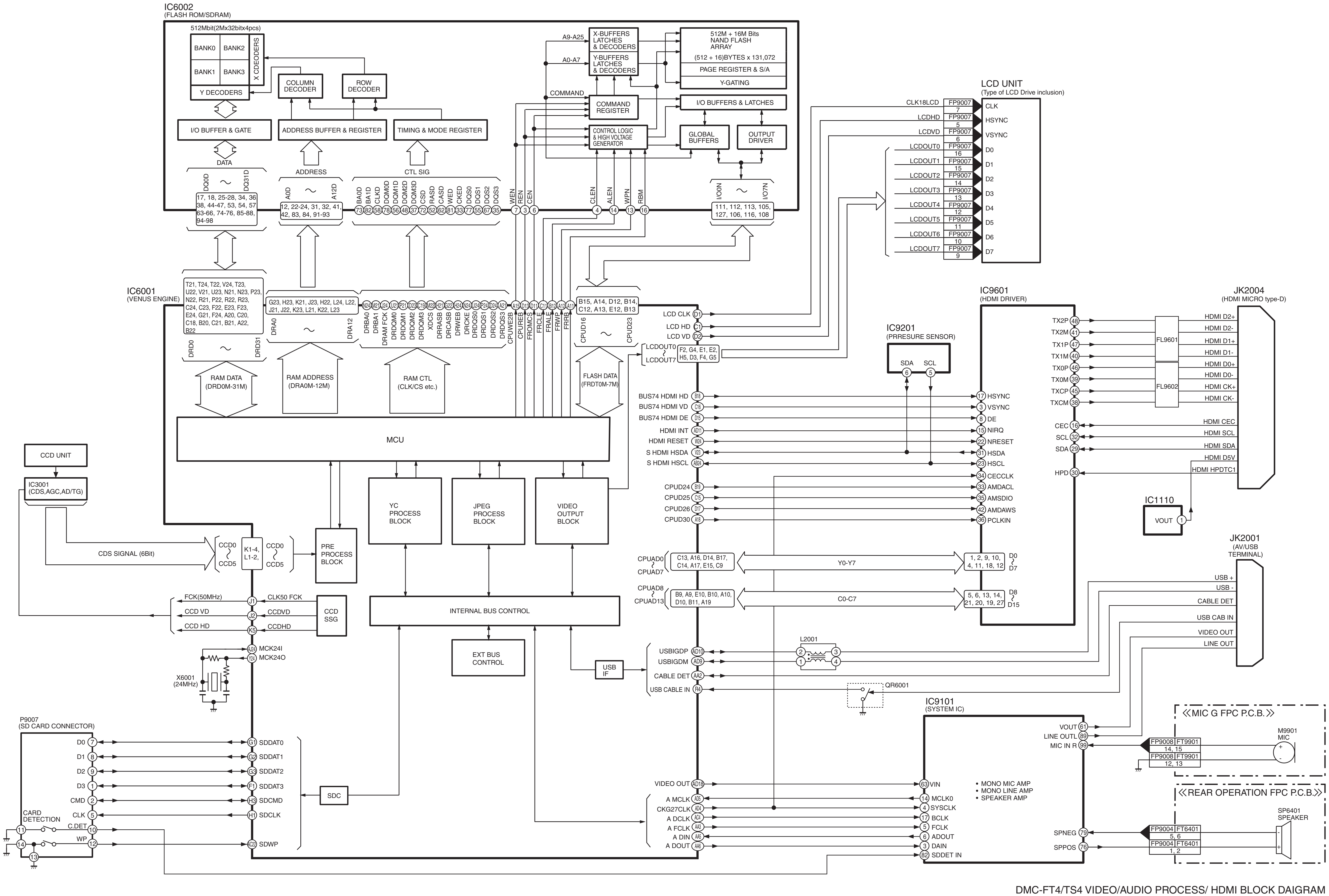
DMC-FT4/TS4 OVERALL BLOCK DIAGRAM

12.2. System Control Block Diagram

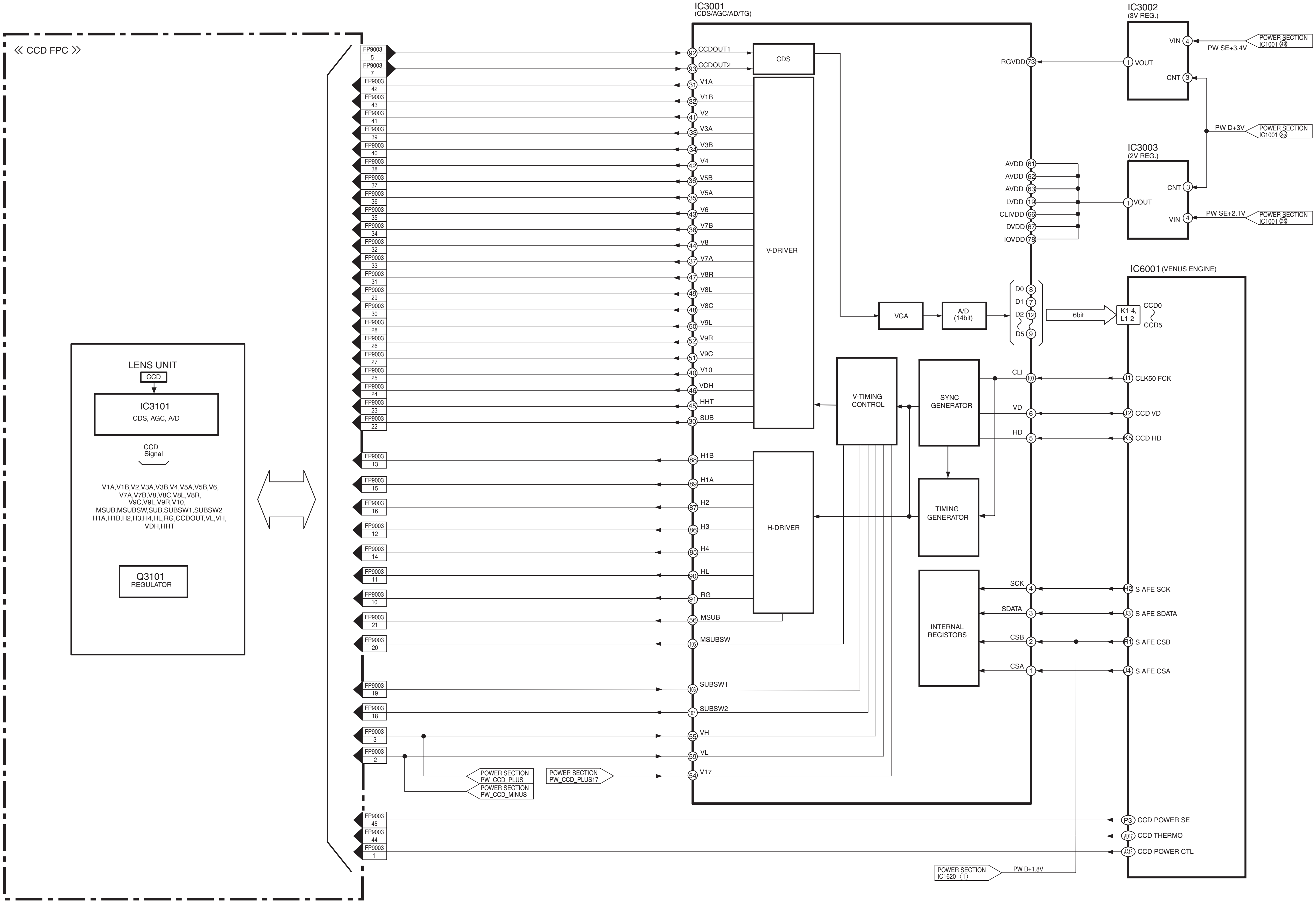


DMC-FT4/TS4 SYSTEM CONTROL BLOCK DIAGRAM

12.3. Video/Audio Signal Process Block Diagram

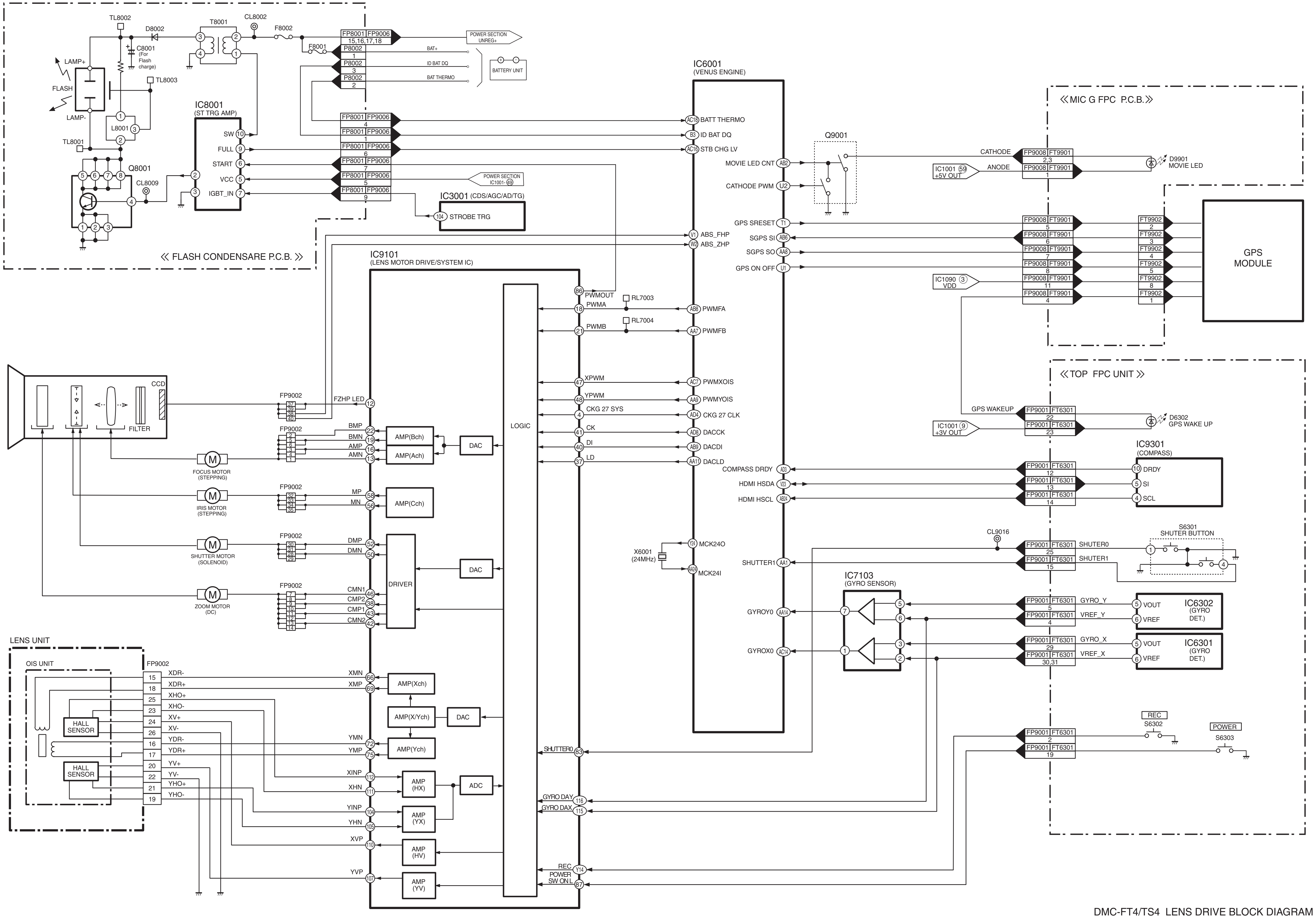


12.4. Sensor Block Diagram



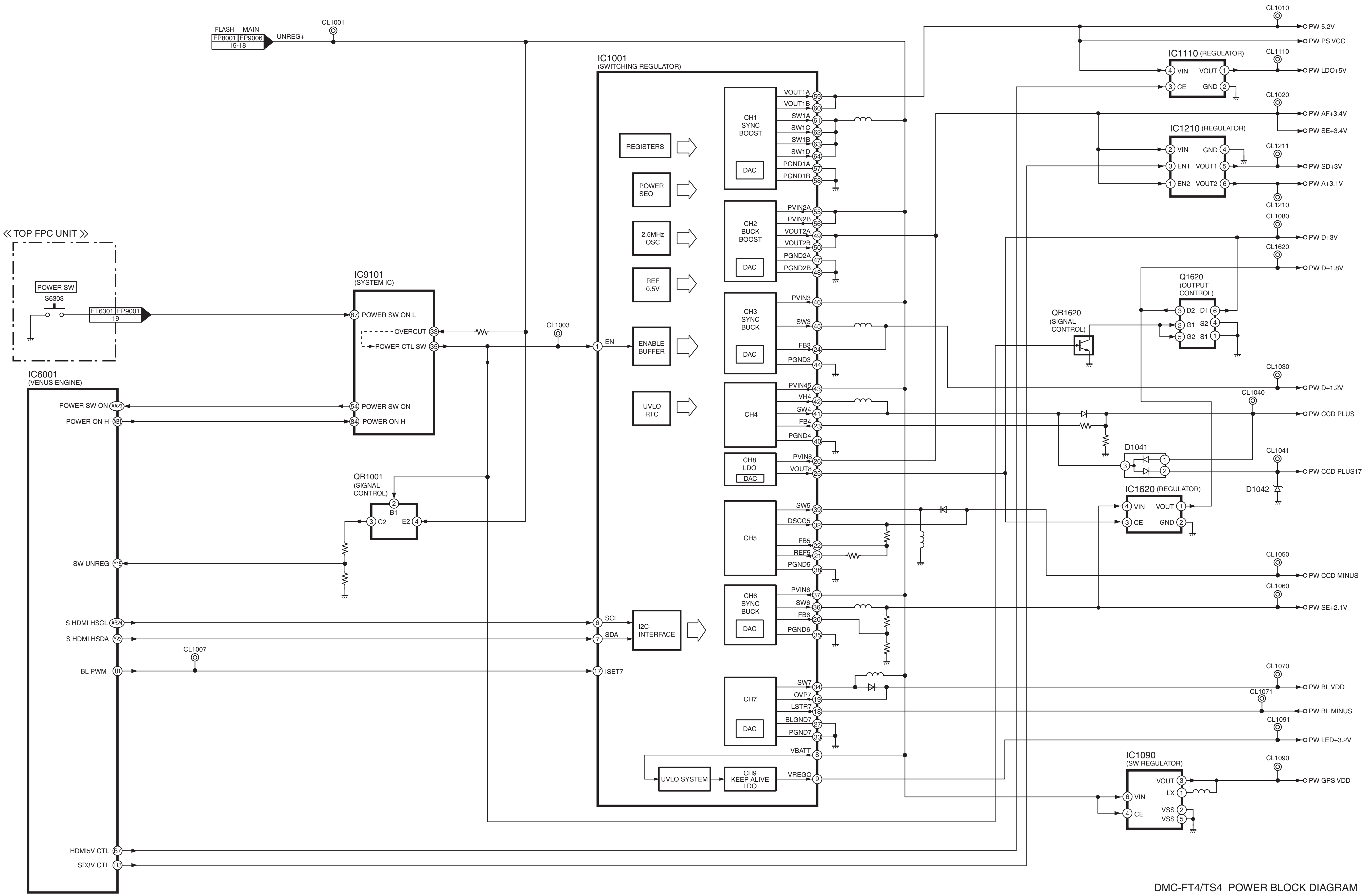
DMC-FT4/TS4 SENSOR BLOCK DIAGRAM

12.5. Lens Drive Block Diagram



DMC-FT4/TS4 LENS DRIVE BLOCK DIAGRAM

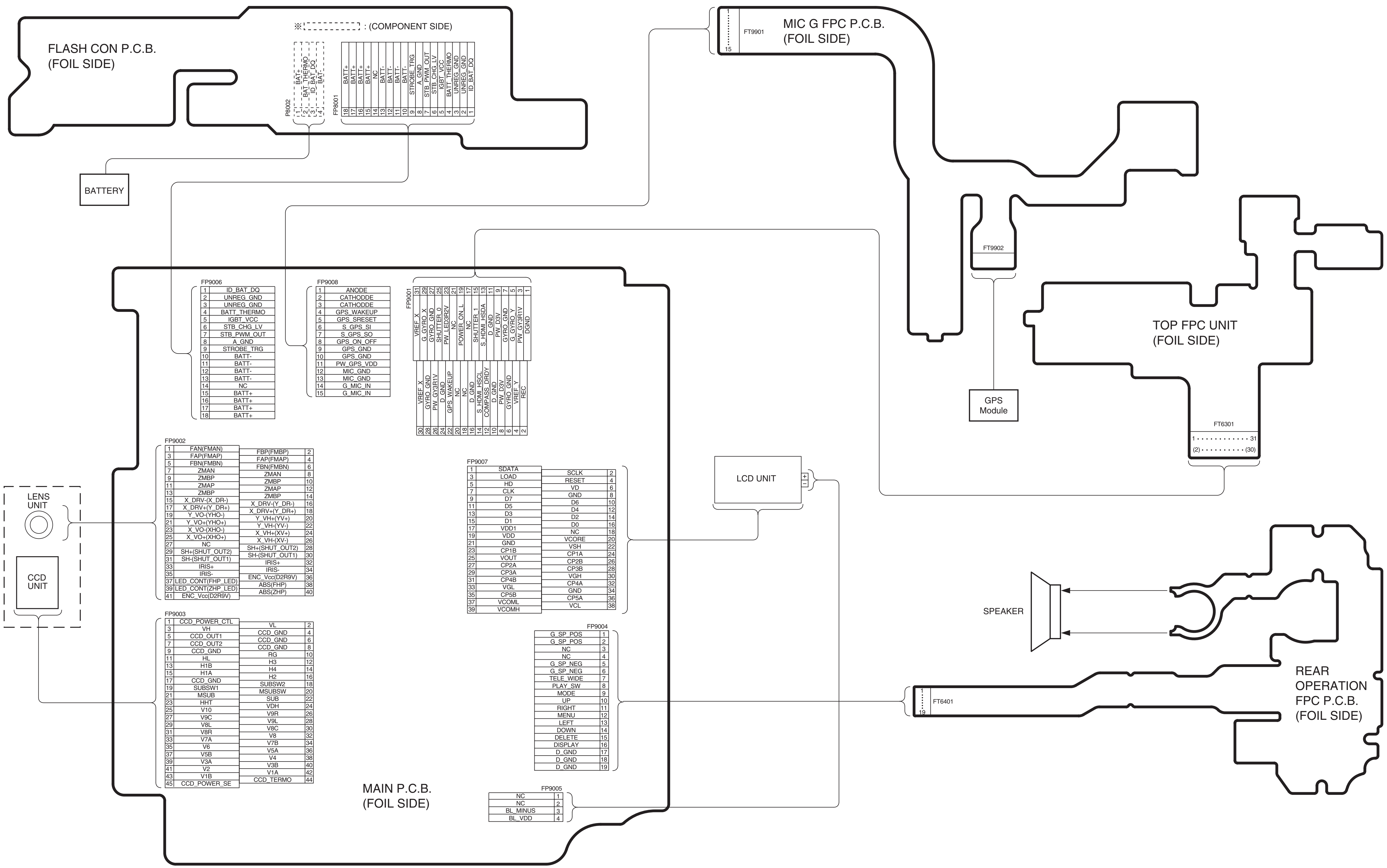
12.6. Power Block Diagram



DMC-FT4/TS4 POWER BLOCK DIAGRAM

13 Wiring Connection Diagram

13.1. Interconnection Schematic Diagram



DMC-FT4/TS4
INTERCONNECTION
SCHEMATIC DIAGRAM

IMPORTANT SAFETY NOTICE:

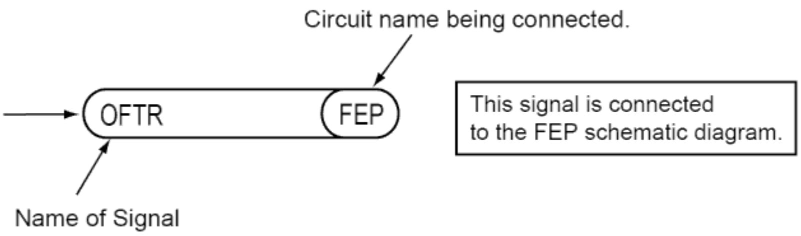
COMPONENTS IDENTIFIED WITH THE MARK ⚠ HAVE THE SPECIAL CHARACTERISTICS FOR SAFETY. WHEN REPLACING ANY OF THESE COMPONENTS USE ONLY THE SAME TYPE.

1.Although reference number of the parts is indicated on the P.C.B. drawing and/or schematic diagrams, it is NOT mounted on the P.C.B. when it is displayed with "$" mark.

2.It is only the "Test Round" and no terminal (Pin) is available on the P.C.B. when the TP (Test Point) indicated as "●" mark.

3.Use the parts number indicated on the Replacement Parts List .

4.Indication on Schematic diagrams:



5. It might be taking time for display and/or access of the Schematic Diagrams & P. C. B having the heavy data volume.

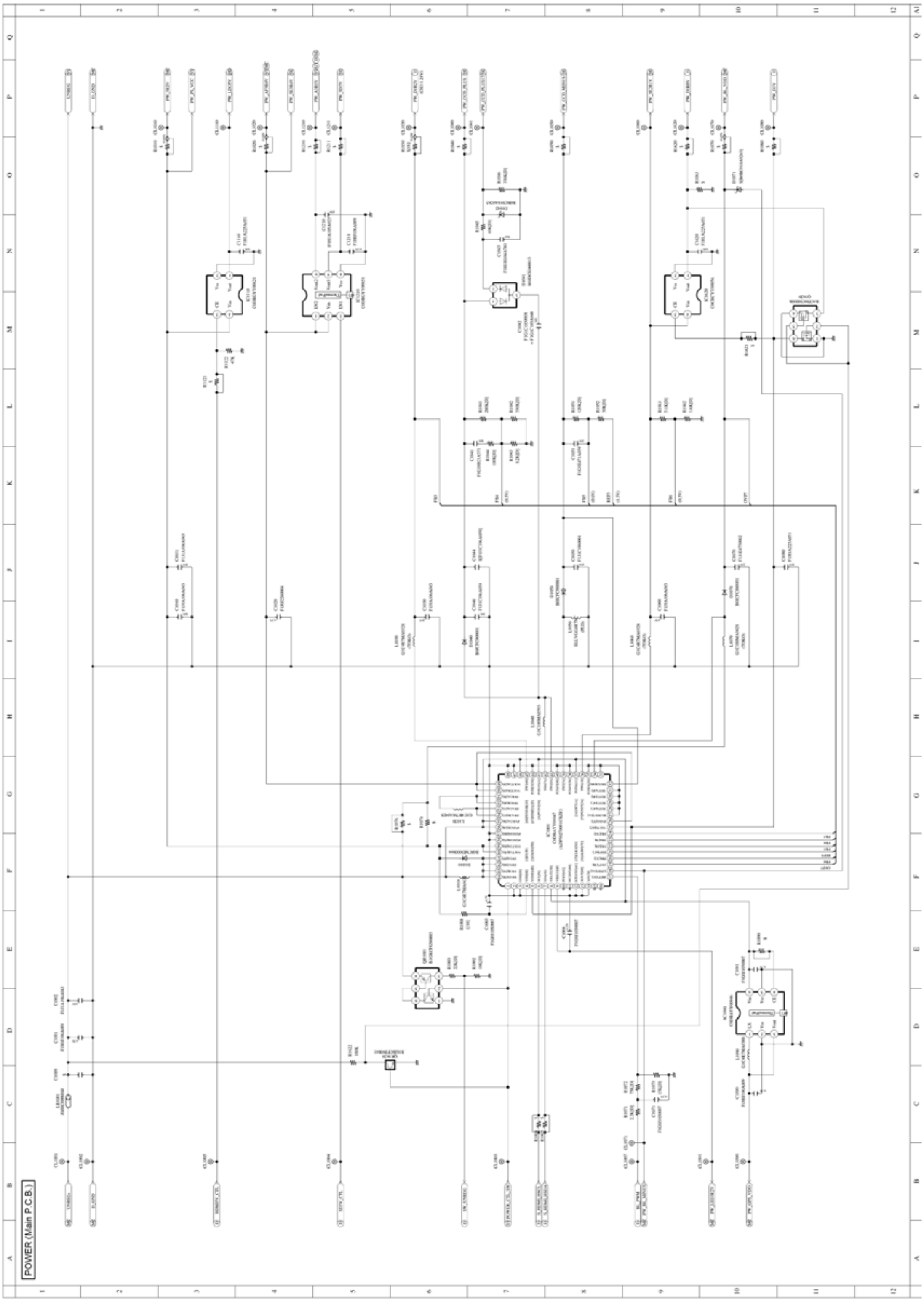
Note:
1. * Be sure to make your orders of replacement parts according to this list.
2. IMPORTANT SAFETY NOTICE
   Components identified with the mark ⚠ have the special characteristics for safety.
   When replacing any of these components, use only the same type.
3. Unless otherwise specified,
   All resistors are in OHMS, K=1,000 OHMS. All capacitors are in MICRO-FARADS (uf), P=uuF.
4. The marking (RTL) indicates the retention time is limited for this item. After the discontinuation of this assembly in production, it will no longer be available.
5. Supply of CD-ROM, in accordance with license protection, is allowable as replacement parts only for customers who accidentally damaged or lost their own.

E.S.D. standards for Electrostatically Sensitive Devices, refer to PREVENTION OF ELECTROSTATIC DISCHARGE (ESD) TO ELECTROSTATICALLY SENSITIVE (ES) DEVICES section.

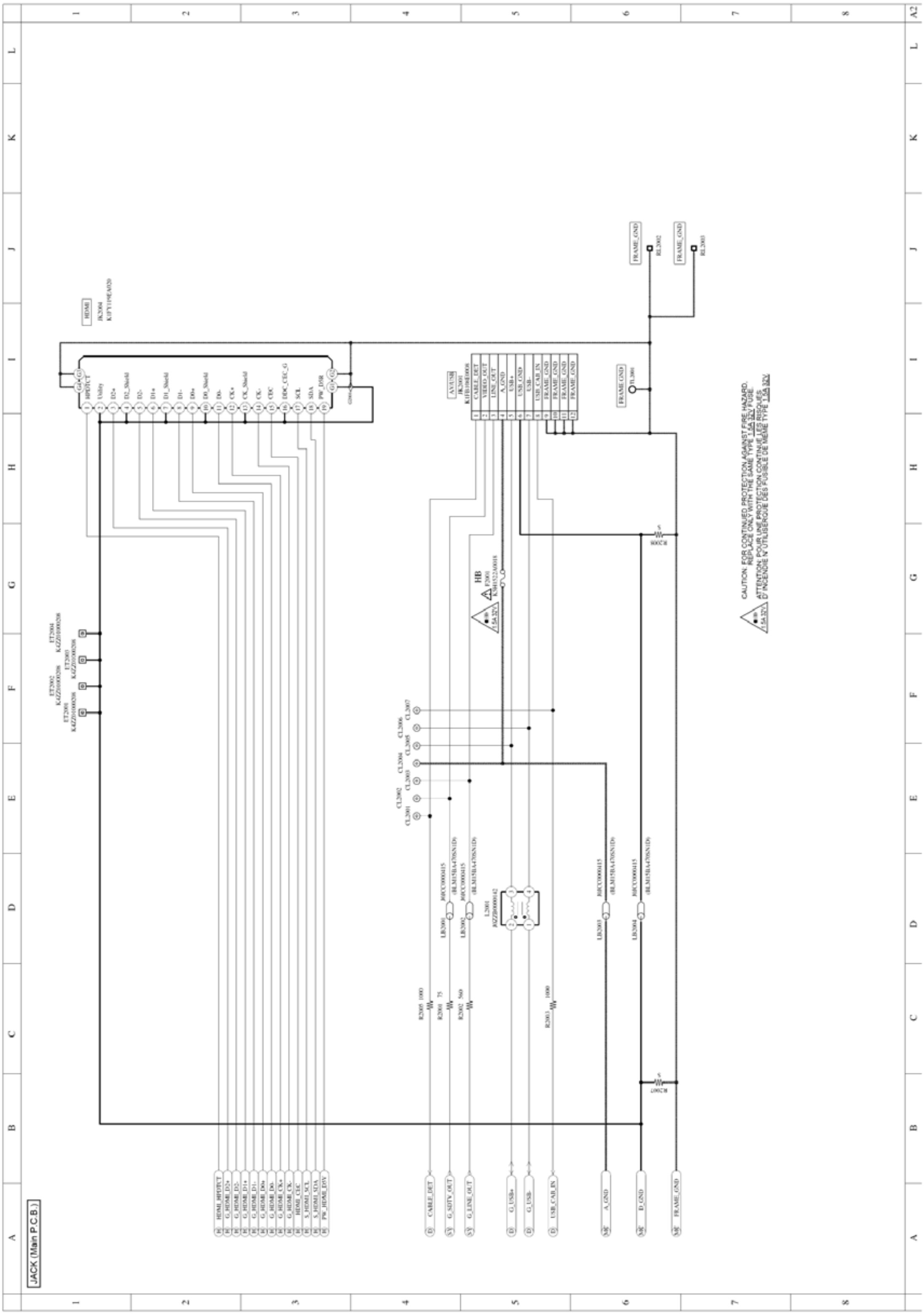
Definition of Parts supplier:

1. **Parts marked with [ENERGY] in the remarks column are supplied from Panasonic Corporation Energy Company.**
2. **Parts marked with [PAVCX] in the remarks column are supplied from PAVCX. Others are supplied from AVC-CSC-SPC.**

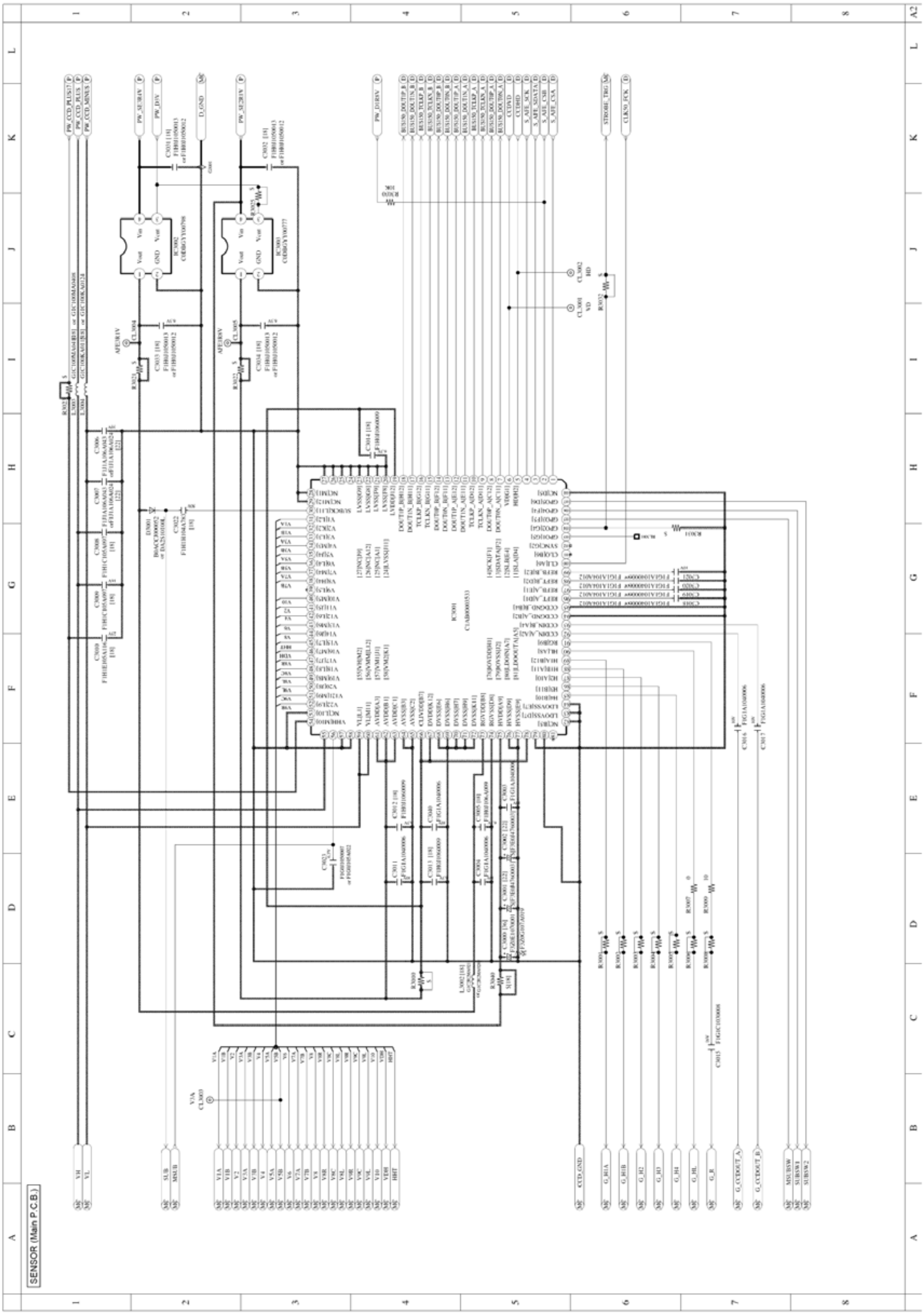
Model No. : DMC-FT4/TS4   Power (P) (Main P.C.B.)



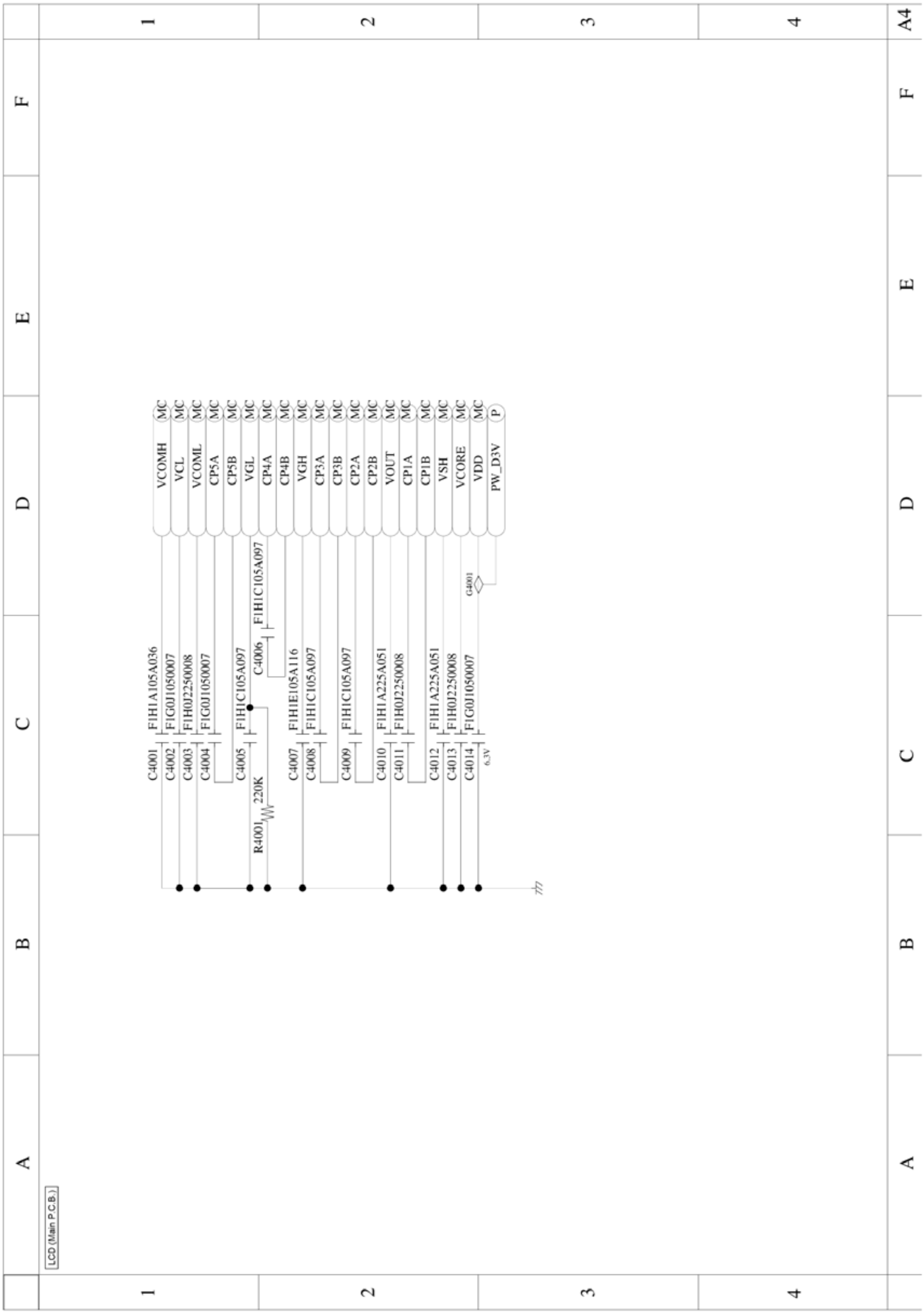
Model No. : DMC-FT4/TS4   Jack (J) (Main P.C.B.)

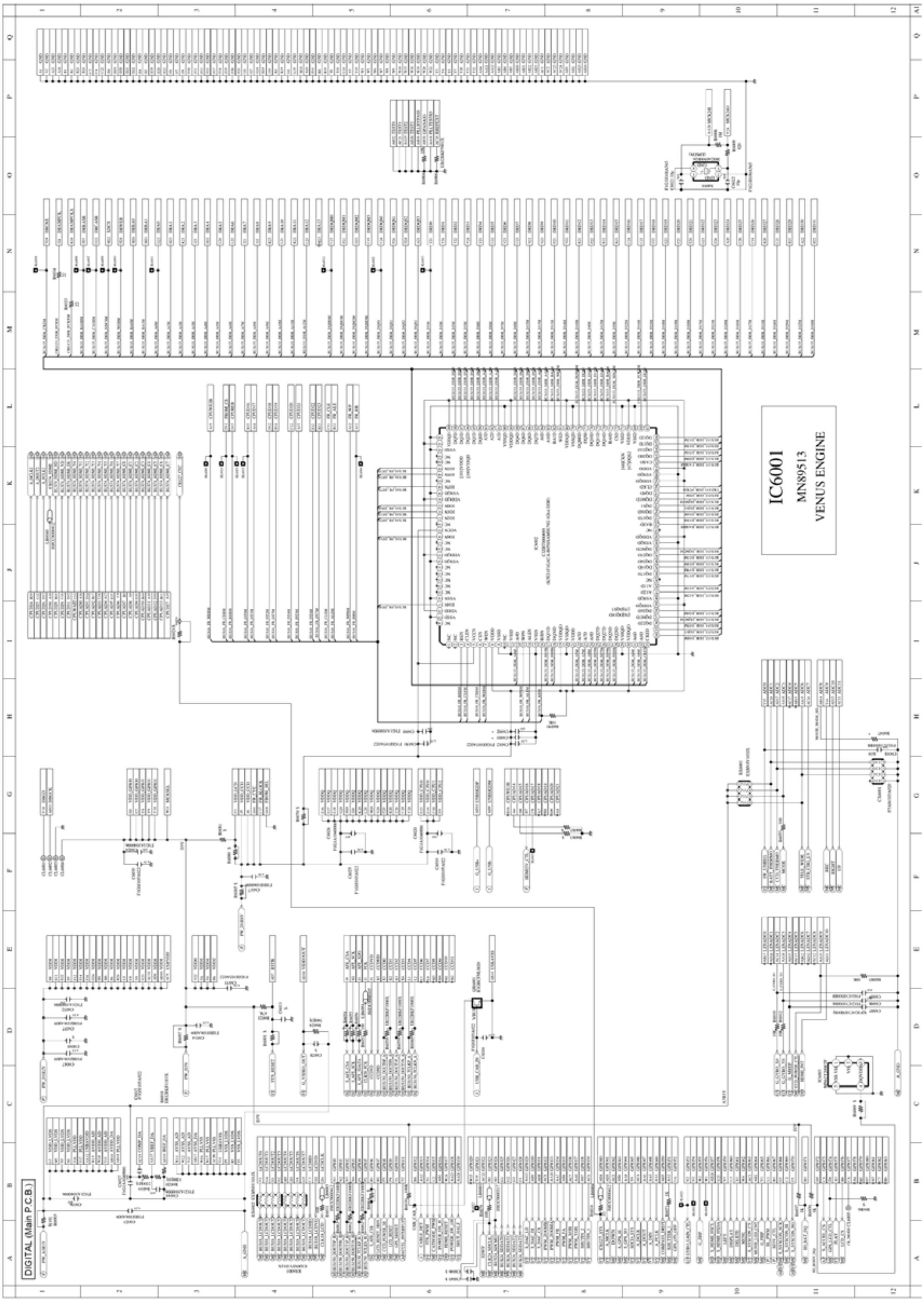


Model No. : DMC-FT4/TS4   Sensor (SE) (Main P.C.B.)

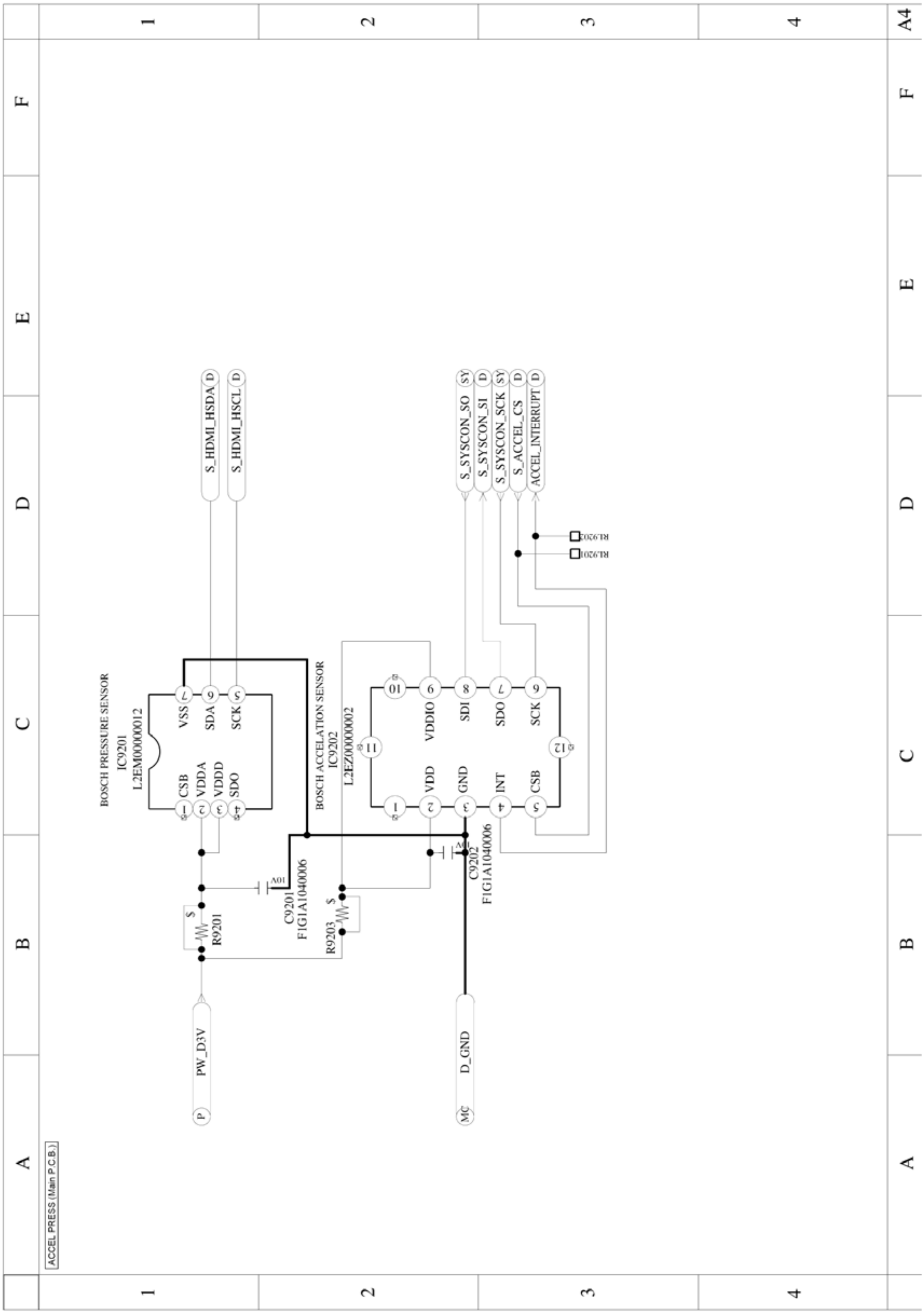


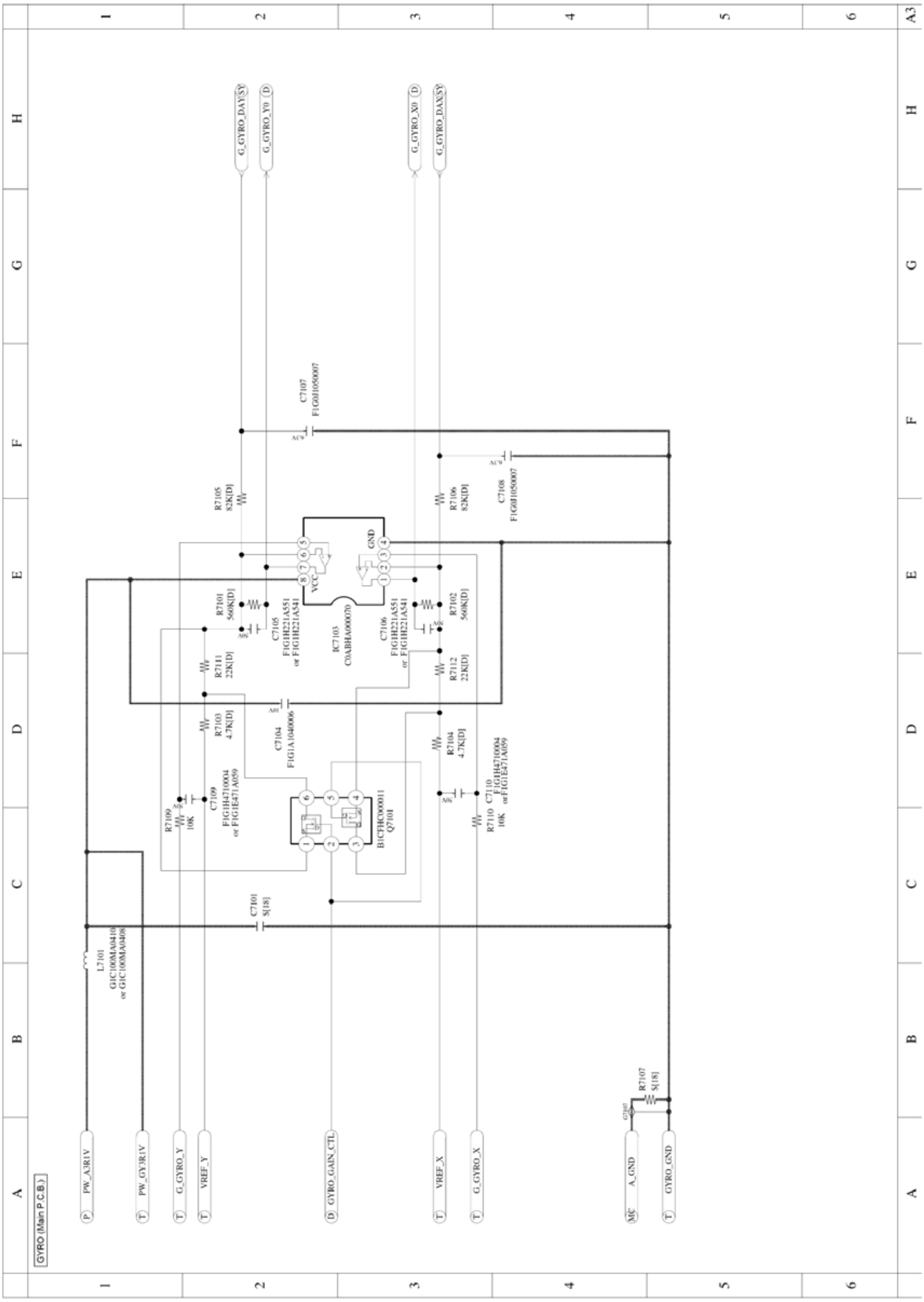
Model No. : DMC-FT4/TS4   LCD (L) (Main P.C.B.)



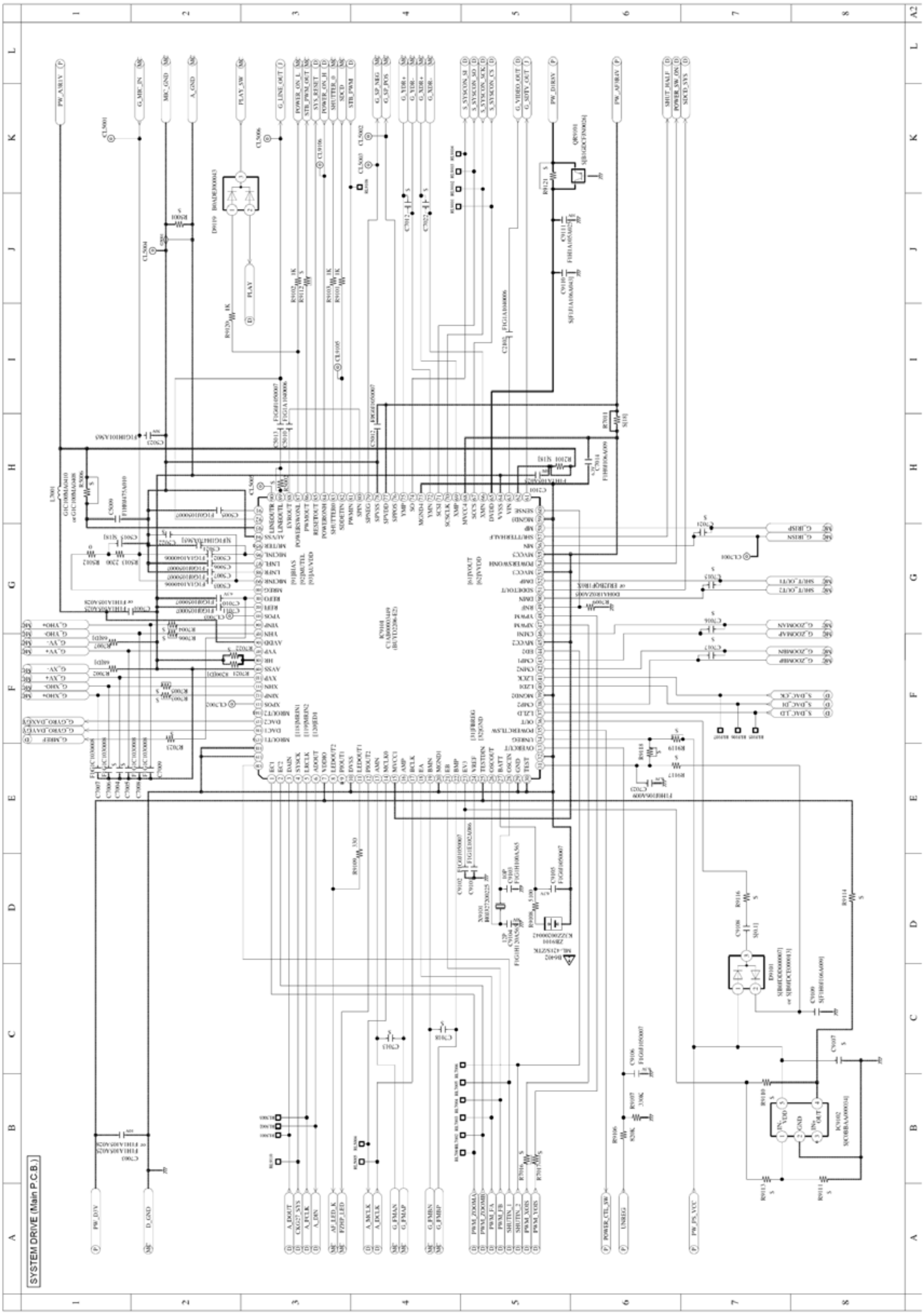

IC6001
MN89513
VENUS ENGINE
DIGITAL (Main P.C.B.)

Model No. : DMC-FT4/TS4 Accelerator Press (AP) (Main P.C.B.)

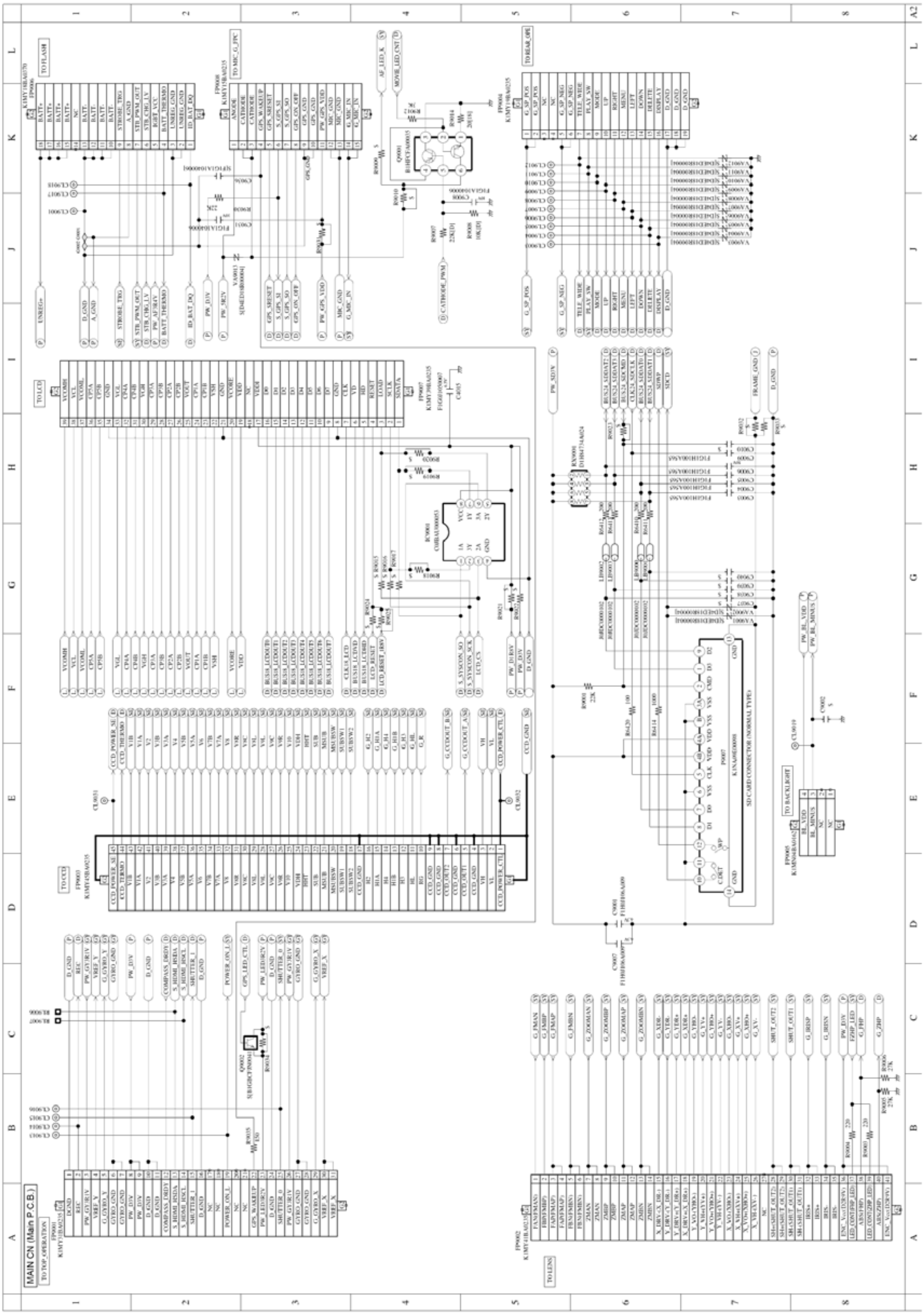



GYRO (Main P.C.B.)
PW_A3R1V
PW_GY3R1V
G_GYRO_Y
VREF_Y
GYRO_GAIN_CTL
VREF_X
G_GYRO_X
A_GND
GYRO_GND
G_GYRO_DAY
G_GYRO_Y0
G_GYRO_X0
G_GYRO_DAX
IC7103
C0ABHA000070
Q7101
B1CFHC000011
L7101
C7101
C7104
C7105
C7106
C7107
C7108
C7109
C7110
R7101
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R7111
R7112
VCC
GND
A3

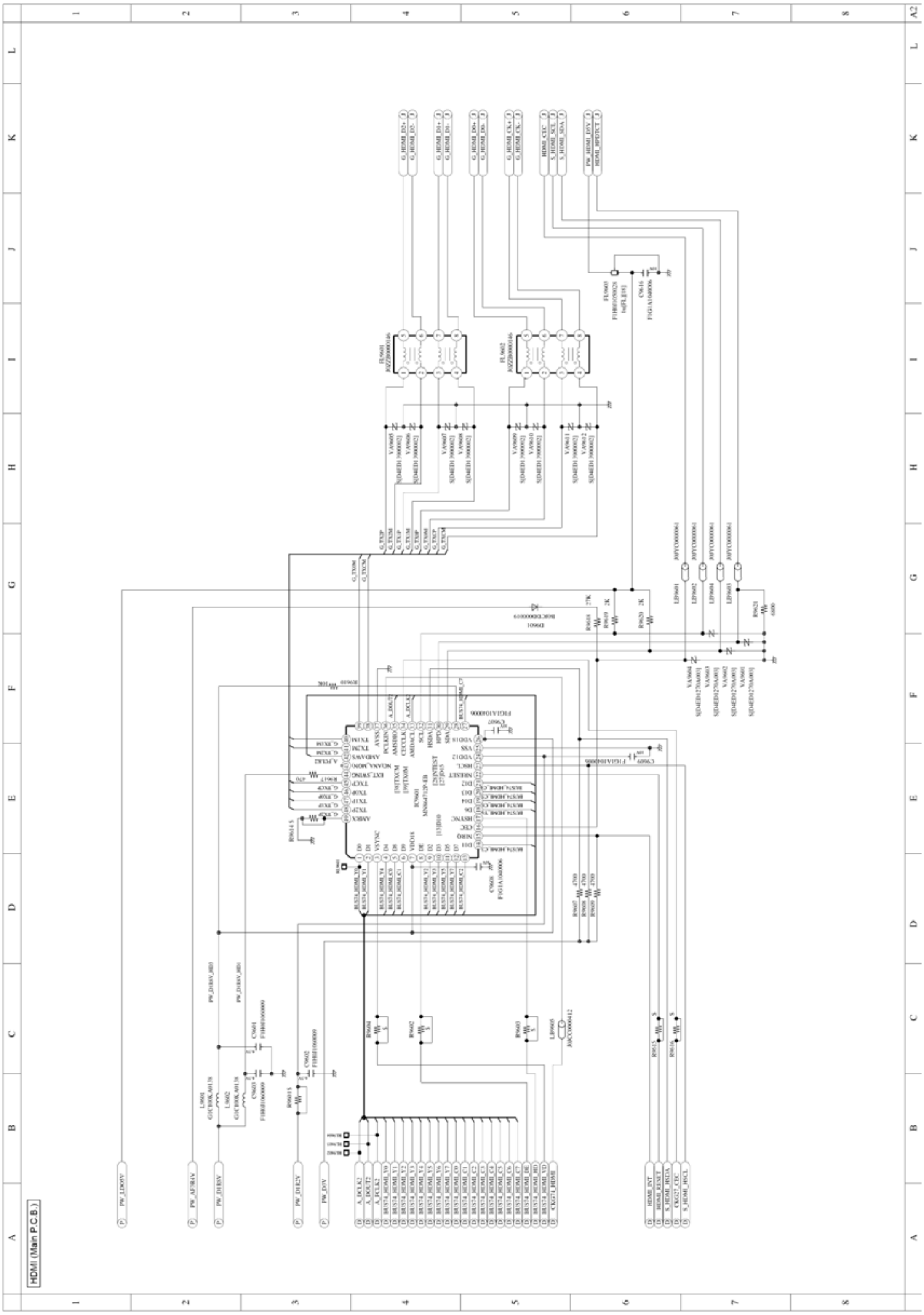
Model No. : DMC-FT4/TS4   System Driver (SY) (Main P.C.B.)



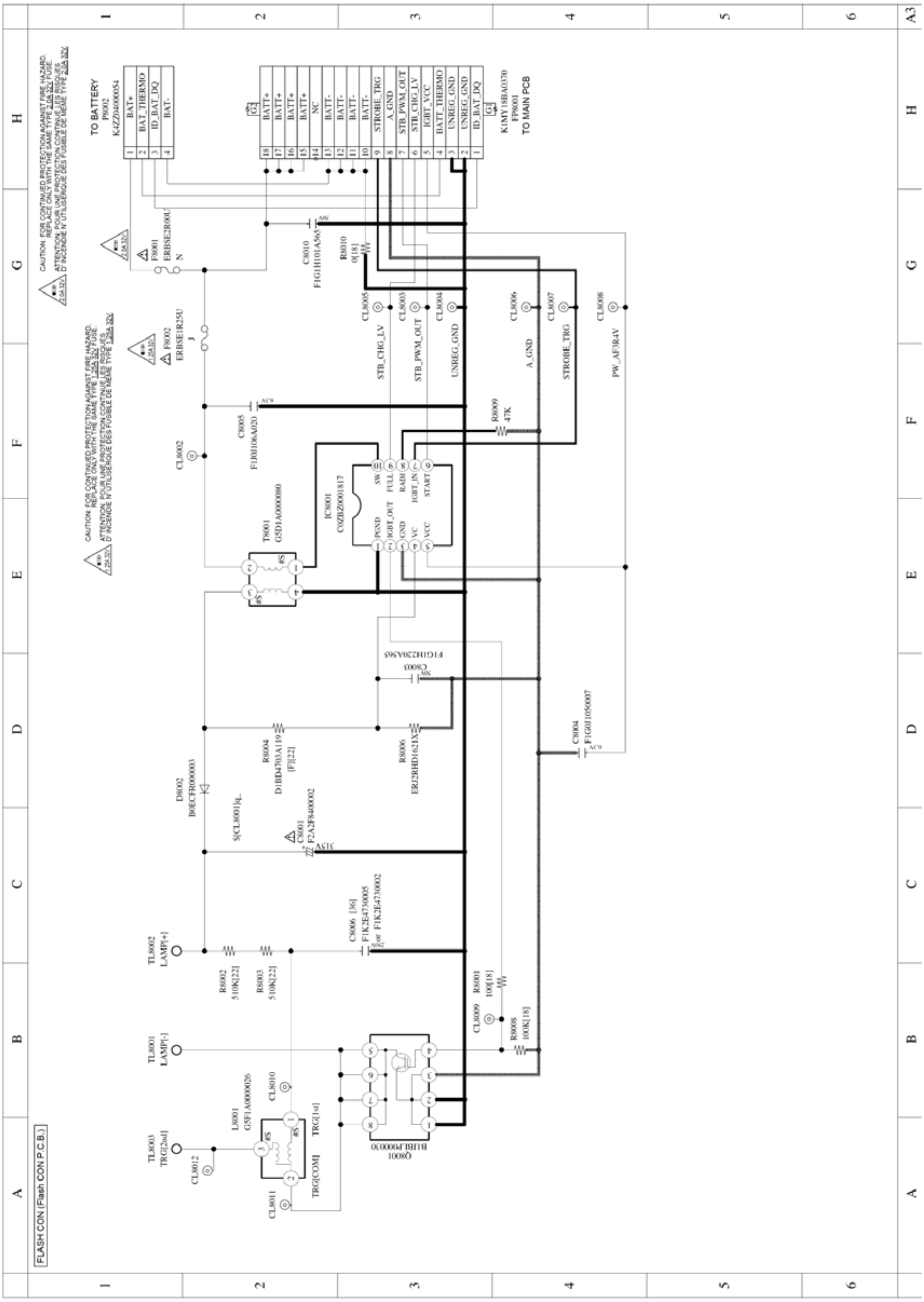
Model No. : DMC-FT4/TS4   Main CN (MC) (Main P.C.B.)



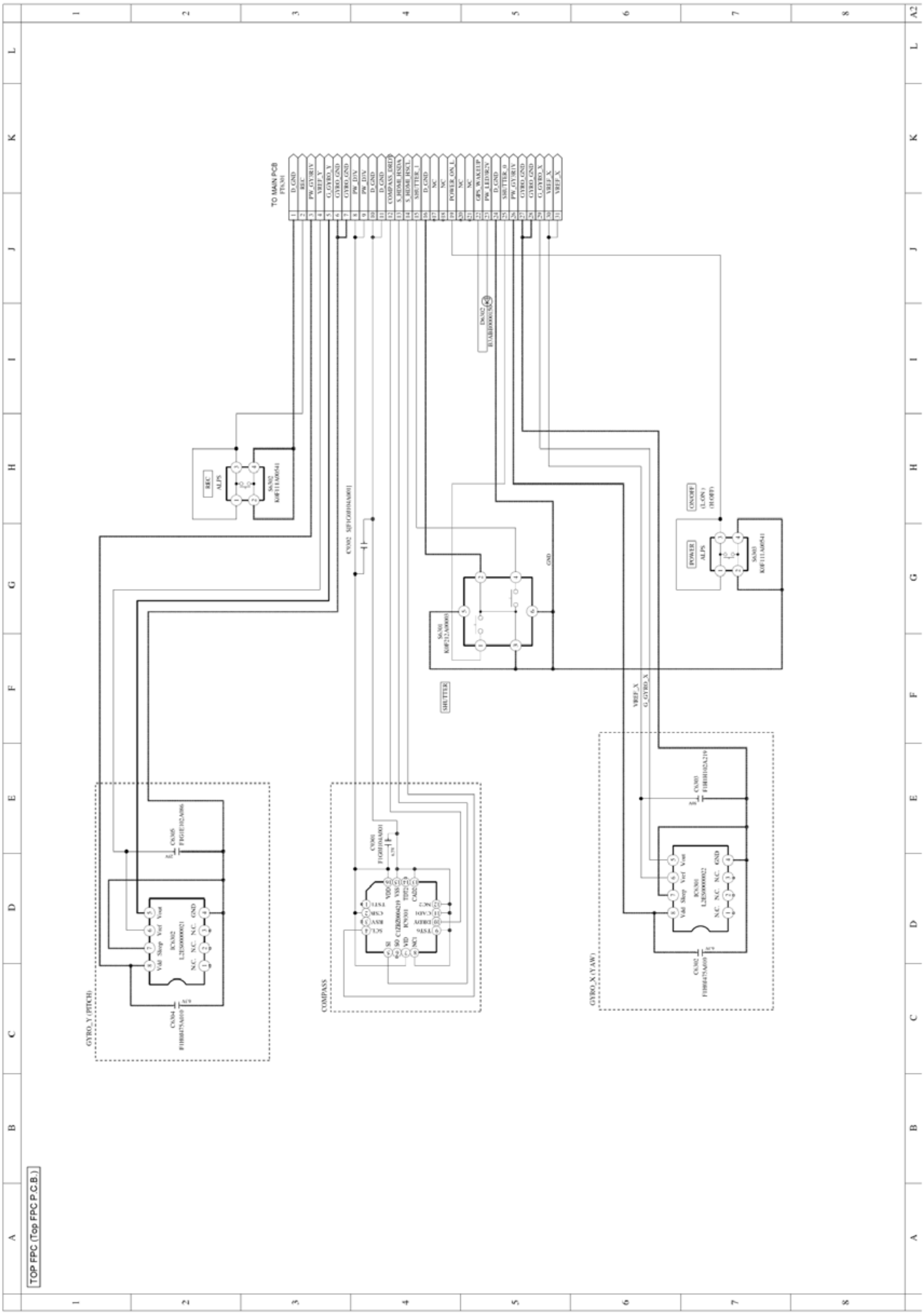
Model No. : DMC-FT4/TS4   HDMI (H) (Main P.C.B.)



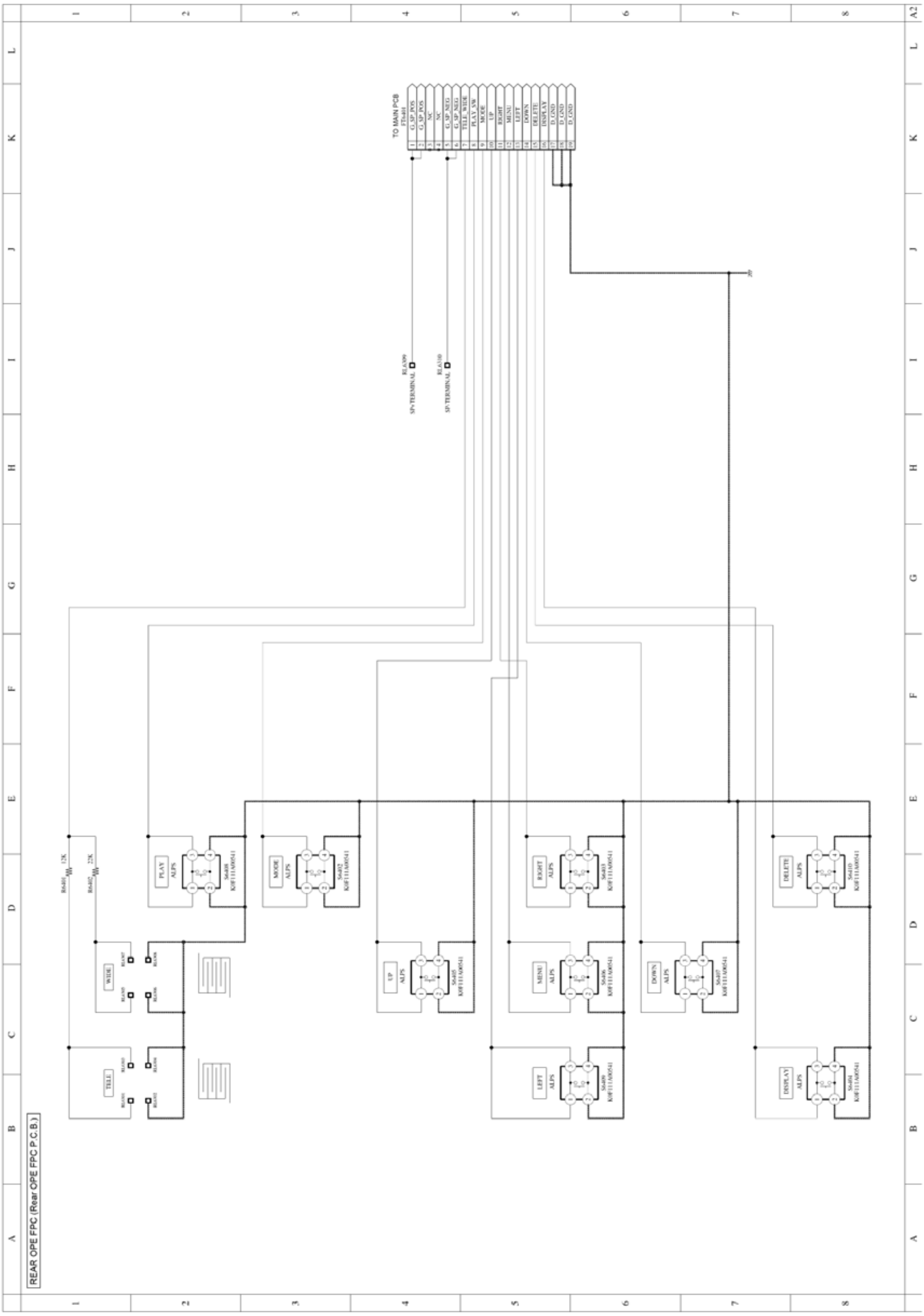
Model No. : DMC-FT4/TS4   Flash CON (Flash CON P.C.B.)



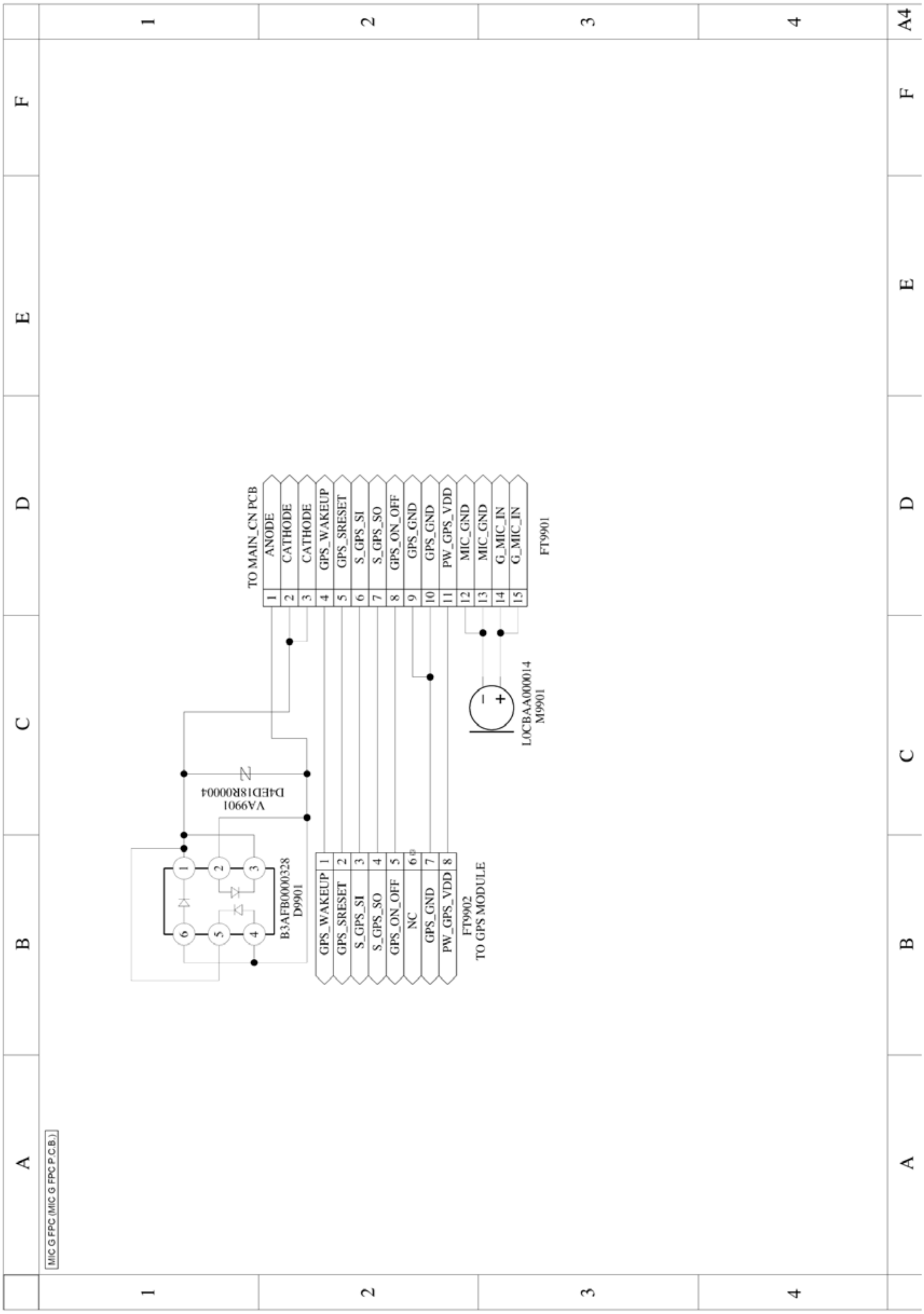
Model No. : DMC-FT4/TS4 Top FPC (Top FPC P.C.B.)



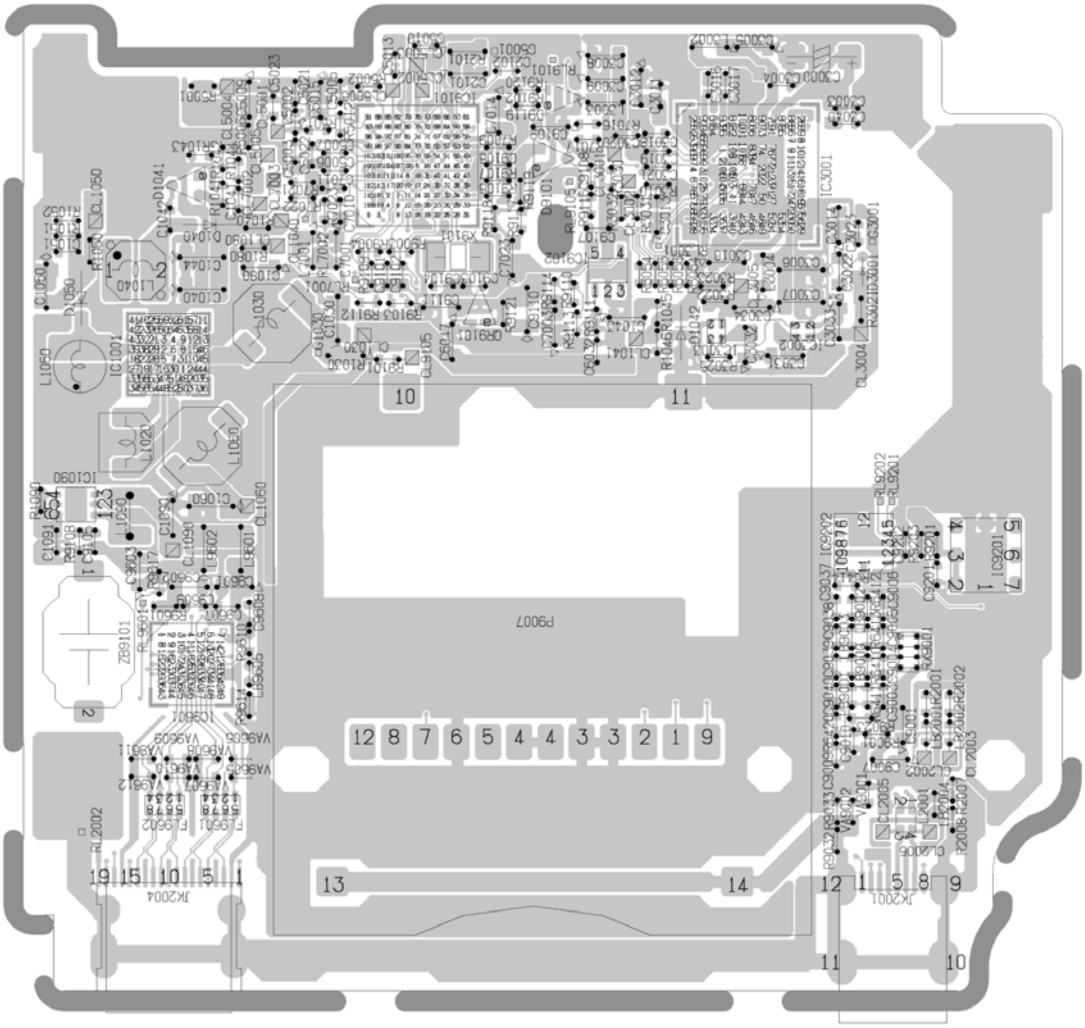
Model No. : DMC-FT4/TS4 Rear OPE FPC (Rear OPE FPC P.C.B.)



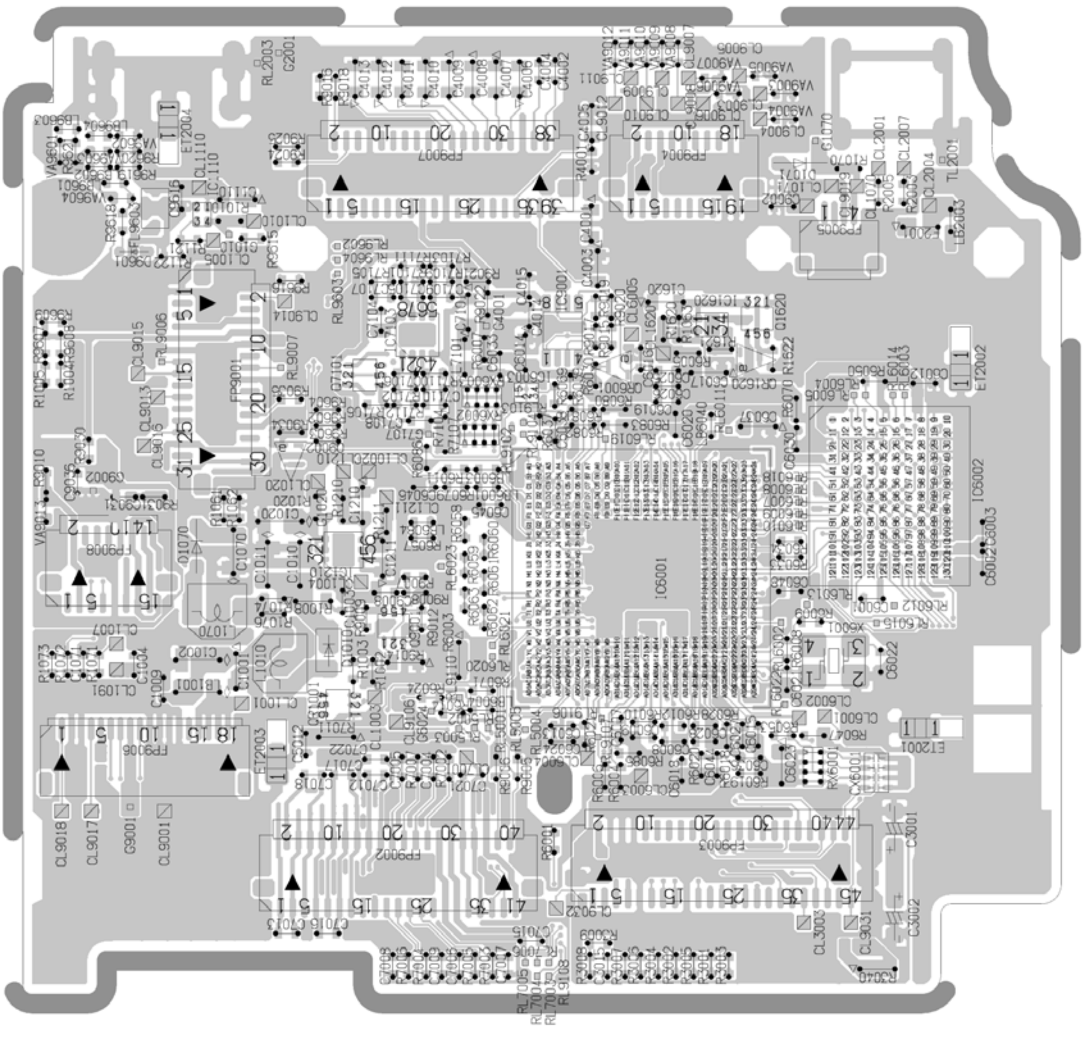
Model No. : DMC-FT4/TS4   MIC G FPC (MIC G FPC P.C.B.)



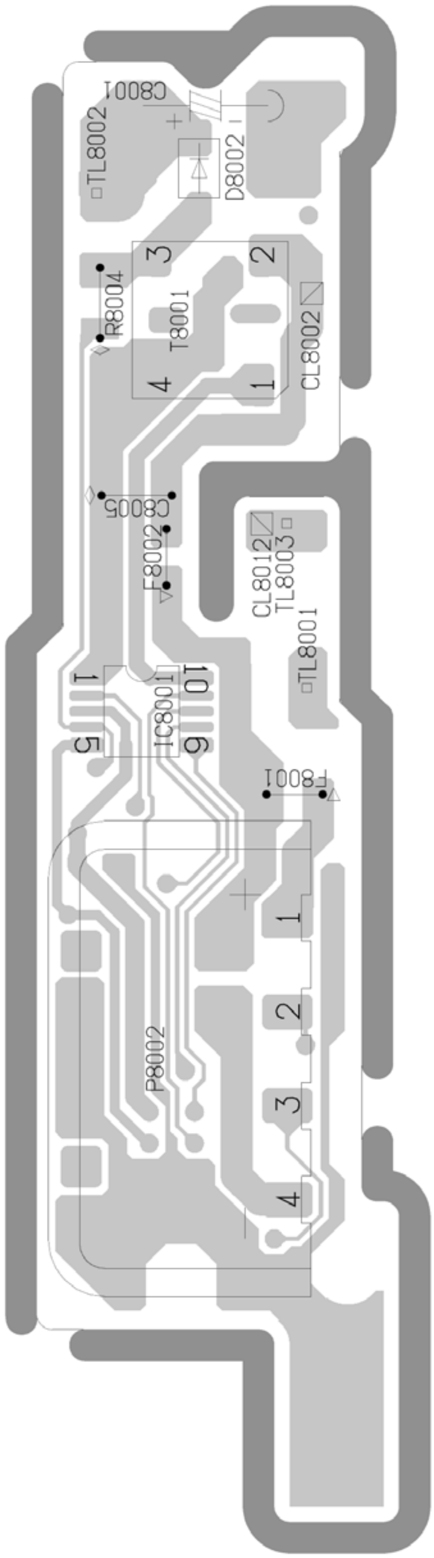
Model No. : DMC-FT4/TS4 Main P.C.B. (Component Side)

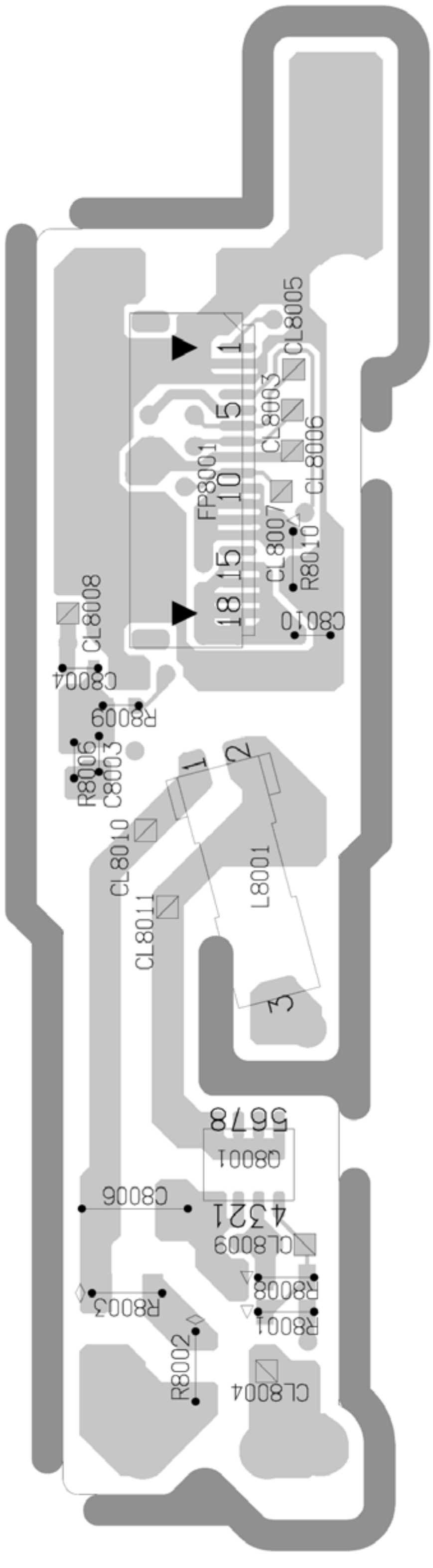


Model No. : DMC-FT4/TS4 Main P.C.B. (Foil Side)



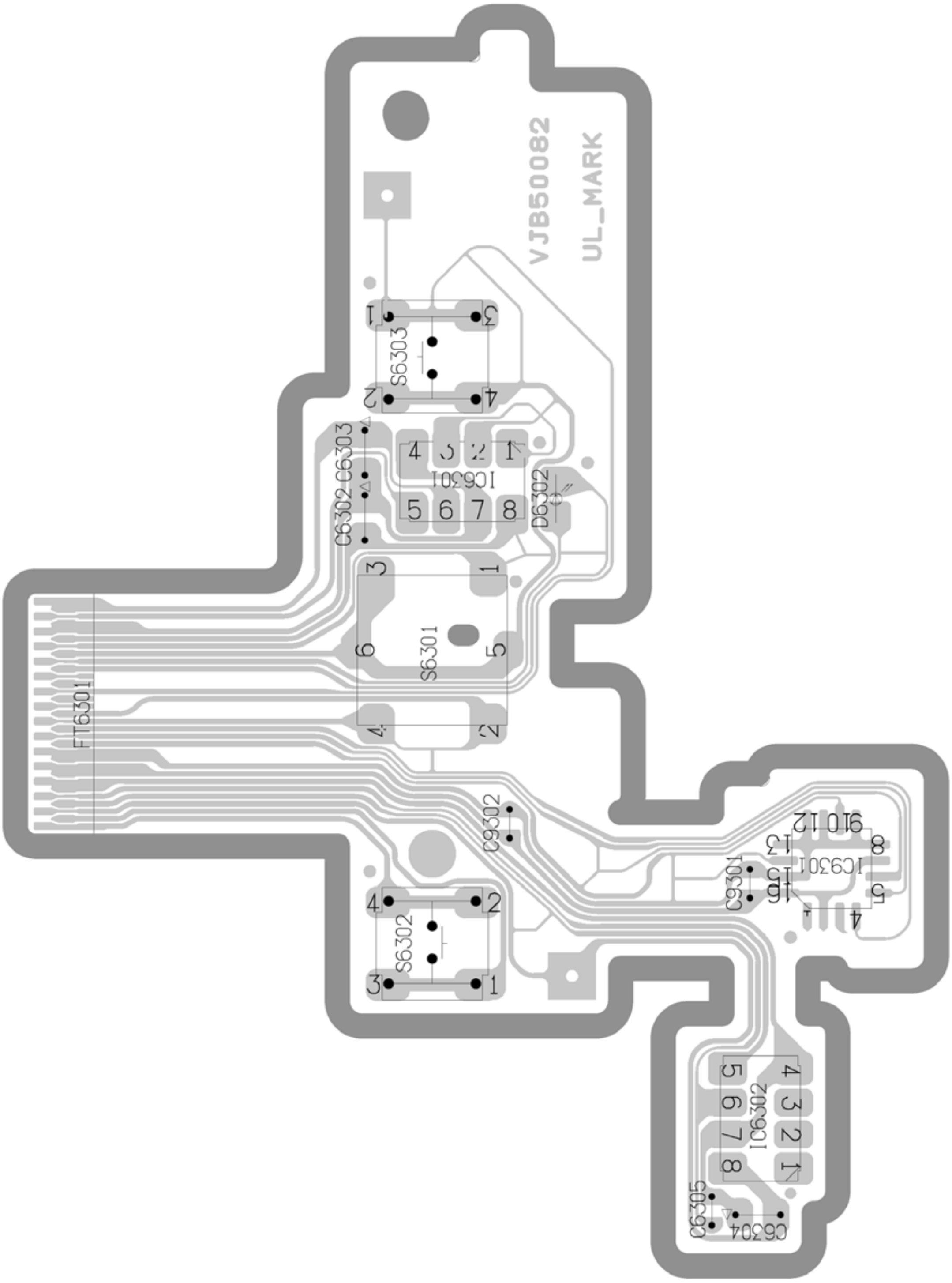
Model No. : DMC-FT4/TS4   Flash CON P.C.B. (Component Side)



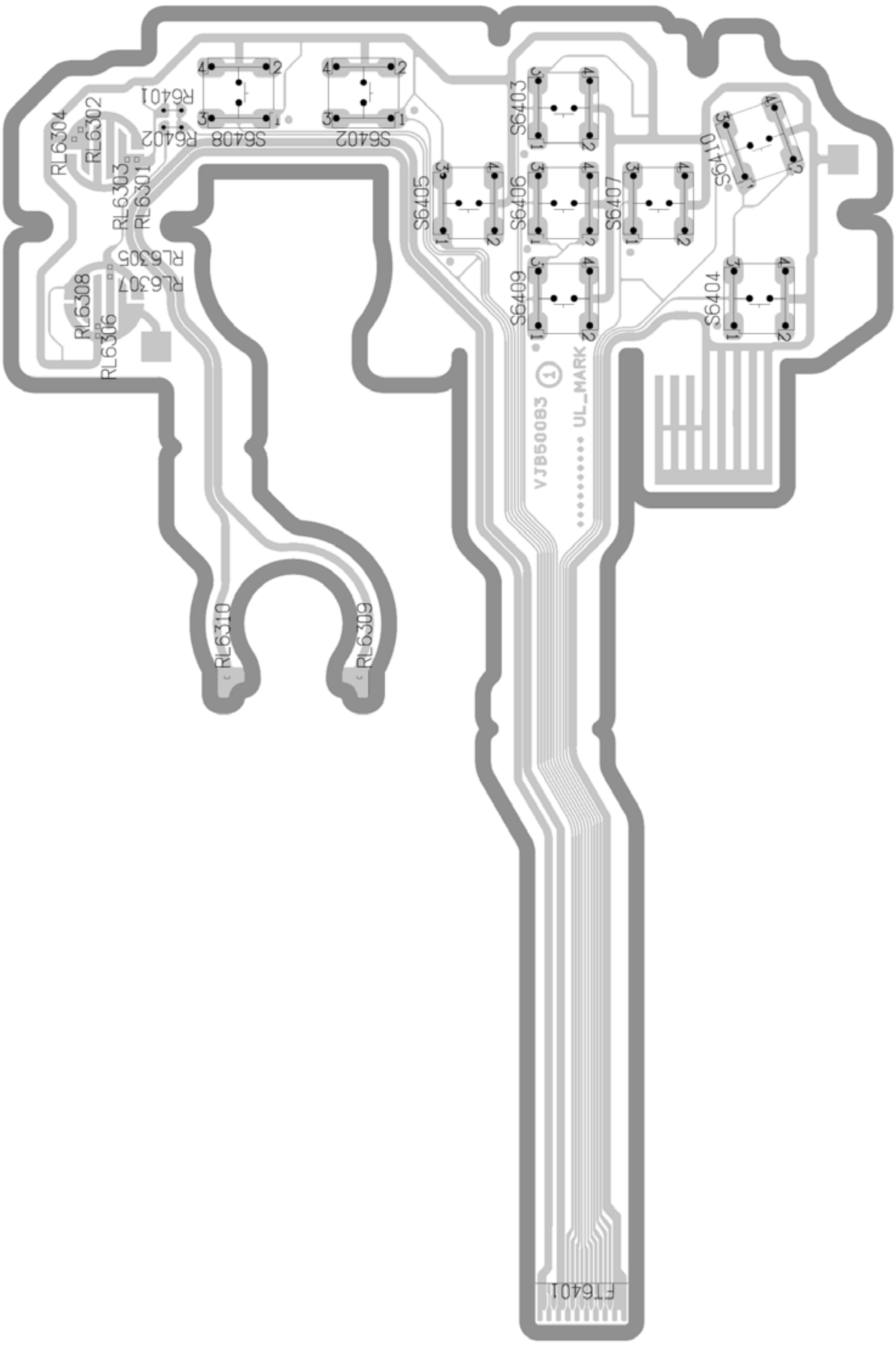


CL8005
CL8003
CL8006
FP8001
CL8007
R8010
C8010
CL8008
C8004
R8009
R8006
C8003
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R8003
R8001
R8002
CL8004

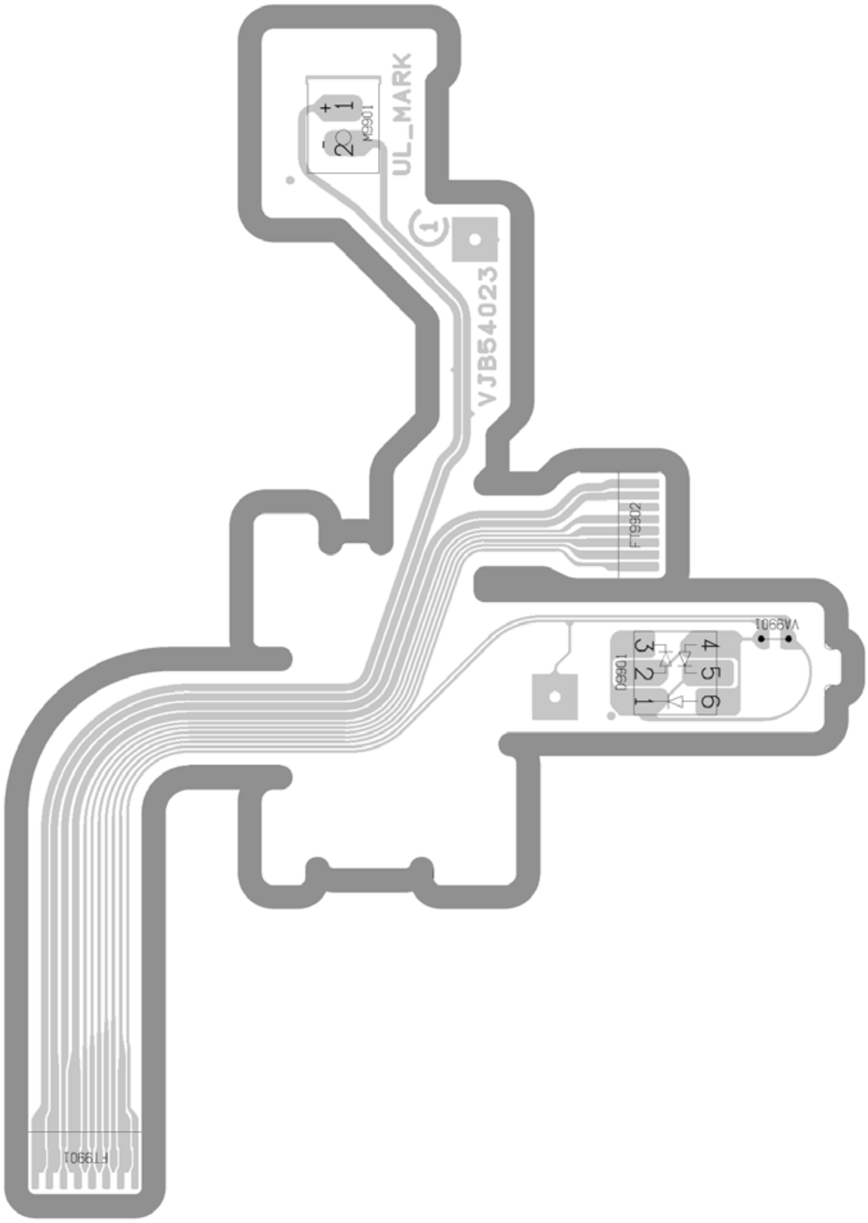
Model No. : DMC-FT4/TS4   Top FPC P.C.B. (Foil Side)



Model No. : DMC-FT4/TS4   Rear OPE FPC P.C.B. (Foil Side)



Model No. : DMC-FT4/TS4 MIC G FPC P.C.B. (Foil Side)



Model No. : DMC-FT4/TS4   Parts List

Safety	Ref. No.	Part No.	Part Name & Description	Q'ty	Remarks
	C1001	F1H0J106A009	C.CAPACITOR CH 6.3V 10U	1	
	C1002	F1J1A106A043	C.CAPACITOR CH 10V 10U	1	
	C1003	F1G0J1050007	C.CAPACITOR CH 6.3V 1U	1	
	C1004	F1G0J1050007	C.CAPACITOR CH 6.3V 1U	1	
	C1010	F1J1A106A043	C.CAPACITOR CH 10V 10U	1	
	C1011	F1J1A106A043	C.CAPACITOR CH 10V 10U	1	
	C1020	F1J0J2260004	C.CAPACITOR CH 6.3V 22U	1	
	C1030	F1J1A106A043	C.CAPACITOR CH 10V 10U	1	
	C1040	F1J1C106A059	C.CAPACITOR CH 16V 10U	1	
	C1041	F1G1H821A571	C.CAPACITOR CH 25V 820P	1	
	C1042	F1G1C1030008	C.CAPACITOR CH 16V 0.01U	1	
	C1043	F1H1H104A913	C.CAPACITOR CH 50V 0.1U	1	
	C1050	F1J1C1060001	C.CAPACITOR CH 16V 10U	1	
	C1051	F1G1E471A059	C.CAPACITOR CH 25V 470P	1	
	C1060	F1J1A106A043	C.CAPACITOR CH 10V 10U	1	
	C1070	F1J1E4750002	C.CAPACITOR CH 25V 4.7U	1	
	C1071	F1G0J1050007	C.CAPACITOR CH 6.3V 1U	1	
	C1080	F1H1A225A051	C.CAPACITOR CH 10V 2.2U	1	
	C1090	F1H0J106A009	C.CAPACITOR CH 6.3V 10U	1	
	C1091	F1G0J1050007	C.CAPACITOR CH 6.3V 1U	1	
	C1110	F1H1A225A051	C.CAPACITOR CH 10V 2.2U	1	
	C1210	ECJ1VB1A105K	C.CAPACITOR CH 10V 1U	1	
	C1211	F1H0J106A009	C.CAPACITOR CH 6.3V 10U	1	
	C1620	F1H1A225A051	C.CAPACITOR CH 10V 2.2U	1	
	C2101	ECJ1VB1A105K	C.CAPACITOR CH 10V 1U	1	
	C2102	F1G1A104A012	C.CAPACITOR CH 10V 0.1U	1	
	C3000	F3Z0E1070001	CAPACITOR	1	
	C3003	F1G1A104A012	C.CAPACITOR CH 10V 0.1U	1	
	C3004	F1G1A104A012	C.CAPACITOR CH 10V 0.1U	1	
	C3005	F1H0J106A009	C.CAPACITOR CH 6.3V 10U	1	
	C3006	F1J1A106A043	C.CAPACITOR CH 10V 10U	1	
	C3007	F1J1A106A043	C.CAPACITOR CH 10V 10U	1	
	C3008	F1H1C105A097	C.CAPACITOR CH 16V 1U	1	
	C3009	F1H1C105A097	C.CAPACITOR CH 16V 1U	1	
	C3010	F1H1E105A116	C.CAPACITOR CH 25V 1U	1	
	C3011	F1G1A104A012	C.CAPACITOR CH 10V 0.1U	1	
	C3012	F1H0J1060009	C.CAPACITOR CH 6.3V 10U	1	
	C3013	F1H0J1060009	C.CAPACITOR CH 6.3V 10U	1	
	C3014	F1H0J1060009	C.CAPACITOR CH 6.3V 10U	1	
	C3015	F1G1C1030008	C.CAPACITOR CH 16V 0.01U	1	
	C3016	F1G1A104A012	C.CAPACITOR CH 10V 0.1U	1	
	C3017	F1G1A104A012	C.CAPACITOR CH 10V 0.1U	1	
	C3018	F1G1A104A012	C.CAPACITOR CH 10V 0.1U	1	
	C3019	F1G1A104A012	C.CAPACITOR CH 10V 0.1U	1	
	C3020	F1G1A104A012	C.CAPACITOR CH 10V 0.1U	1	
	C3021	F1G1A104A012	C.CAPACITOR CH 10V 0.1U	1	
	C3022	F1H1H104A913	C.CAPACITOR CH 50V 0.1U	1	
	C3023	F1G0J1050007	C.CAPACITOR CH 6.3V 1U	1	
	C3031	ECJ1VB0J105K	C.CAPACITOR CH 6.3V 1U	1	
	C3032	ECJ1VB0J105K	C.CAPACITOR CH 6.3V 1U	1	
	C3033	ECJ1VB0J105K	C.CAPACITOR CH 6.3V 1U	1	
	C3034	ECJ1VB0J105K	C.CAPACITOR CH 6.3V 1U	1	
	C3040	F1G1A104A012	C.CAPACITOR CH 10V 0.1U	1	
	C4001	ECJ1VB1A105K	C.CAPACITOR CH 10V 1U	1	
	C4002	F1G0J1050007	C.CAPACITOR CH 6.3V 1U	1	
	C4003	F1H0J2250008	C.CAPACITOR CH 6.3V 2.2U	1	
	C4004	F1G0J1050007	C.CAPACITOR CH 6.3V 1U	1	
	C4005	F1H1C105A097	C.CAPACITOR CH 16V 1U	1	
	C4006	F1H1C105A097	C.CAPACITOR CH 16V 1U	1	
	C4007	F1H1E105A116	C.CAPACITOR CH 25V 1U	1	
	C4008	F1H1C105A097	C.CAPACITOR CH 16V 1U	1	
	C4009	F1H1C105A097	C.CAPACITOR CH 16V 1U	1	

Model No. : DMC-FT4/TS4 Parts List

Safety	Ref. No.	Part No.	Part Name & Description	Q'ty	Remarks
	C4010	F1H1A225A051	C.CAPACITOR CH 10V 2.2U	1	
	C4011	F1H0J2250008	C.CAPACITOR CH 6.3V 2.2U	1	
	C4012	F1H1A225A051	C.CAPACITOR CH 10V 2.2U	1	
	C4013	F1H0J2250008	C.CAPACITOR CH 6.3V 2.2U	1	
	C4014	F1G0J1050007	C.CAPACITOR CH 6.3V 1U	1	
	C4015	F1G0J1050007	C.CAPACITOR CH 6.3V 1U	1	
	C5002	F1G1A104A012	C.CAPACITOR CH 10V 0.1U	1	
	C5003	F1G1A104A012	C.CAPACITOR CH 10V 0.1U	1	
	C5005	F1G0J1050007	C.CAPACITOR CH 6.3V 1U	1	
	C5006	F1G0J1050007	C.CAPACITOR CH 6.3V 1U	1	
	C5007	F1G0J1050007	C.CAPACITOR CH 6.3V 1U	1	
	C5009	F1H0J4750005	C.CAPACITOR CH 6.3V 4.7U	1	
	C5010	F1G1A104A012	C.CAPACITOR CH 10V 0.1U	1	
	C5012	F1G0J1050007	C.CAPACITOR CH 6.3V 1U	1	
	C5013	F1G0J1050007	C.CAPACITOR CH 6.3V 1U	1	
	C5023	ECJ0EC1H101J	C.CAPACITOR CH 50V 100P	1	
	C6001	F1G1A104A012	C.CAPACITOR CH 10V 0.1U	1	
	C6002	F1G1A104A012	C.CAPACITOR CH 10V 0.1U	1	EE,GC,GN,P,PC,PU,GH,GD
	C6003	F1G1A104A012	C.CAPACITOR CH 10V 0.1U	1	EG,EP,EF,EB
	C6008	F1G1C1030008	C.CAPACITOR CH 16V 0.01U	1	
	C6009	F1G1C1030008	C.CAPACITOR CH 16V 0.01U	1	
	C6012	F1G0J1050007	C.CAPACITOR CH 6.3V 1U	1	
	C6014	F1H0J106A009	C.CAPACITOR CH 6.3V 10U	1	
	C6015	F1G0J1050007	C.CAPACITOR CH 6.3V 1U	1	
	C6016	F1G0J1050007	C.CAPACITOR CH 6.3V 1U	1	
	C6017	F1H0J1060009	C.CAPACITOR CH 6.3V 10U	1	
	C6018	F1G1C1030008	C.CAPACITOR CH 16V 0.01U	1	
	C6019	F1G0J1050007	C.CAPACITOR CH 6.3V 1U	1	
	C6020	F1G1A104A012	C.CAPACITOR CH 10V 0.1U	1	
	C6021	ECJ0EC1H100D	C.CAPACITOR CH 50V 10P	1	
	C6022	ECJ0EC1H100D	C.CAPACITOR CH 50V 10P	1	
	C6023	F1H0J106A009	C.CAPACITOR CH 6.3V 10U	1	
	C6024	F1G1A104A012	C.CAPACITOR CH 10V 0.1U	1	
	C6025	F1G0J1050007	C.CAPACITOR CH 6.3V 1U	1	
	C6026	F1G1A104A012	C.CAPACITOR CH 10V 0.1U	1	
	C6027	F1G1A104A012	C.CAPACITOR CH 10V 0.1U	1	
	C6030	F1G0J1050007	C.CAPACITOR CH 6.3V 1U	1	
	C6032	F1G1A104A012	C.CAPACITOR CH 10V 0.1U	1	
	C6033	F1G0J1050007	C.CAPACITOR CH 6.3V 1U	1	
	C6036	F1G1A104A012	C.CAPACITOR CH 10V 0.1U	1	
	C6037	F1H0J106A009	C.CAPACITOR CH 6.3V 10U	1	
	C6038	F1G0J1050007	C.CAPACITOR CH 6.3V 1U	1	
	C6044	F1G1A104A012	C.CAPACITOR CH 10V 0.1U	1	
	C6047	F1H0J106A009	C.CAPACITOR CH 6.3V 10U	1	
	C6302	F1H0J4750005	C.CAPACITOR CH 6.3V 4.7U	1	
	C6303	ECJ1VB1H102K	C.CAPACITOR CH 50V 1000P	1	
	C6304	F1H0J4750005	C.CAPACITOR CH 6.3V 4.7U	1	
	C6305	F1G1H1020008	C.CAPACITOR CH 50V 1000P	1	
	C7001	ECJ1VB1A105K	C.CAPACITOR CH 10V 1U	1	
	C7003	ECJ1VB1A105K	C.CAPACITOR CH 10V 1U	1	
	C7006	F1G1C1030008	C.CAPACITOR CH 16V 0.01U	1	
	C7007	F1G1C1030008	C.CAPACITOR CH 16V 0.01U	1	
	C7008	F1G1C1030008	C.CAPACITOR CH 16V 0.01U	1	
	C7009	F1G1C1030008	C.CAPACITOR CH 16V 0.01U	1	
	C7010	F1G0J1050007	C.CAPACITOR CH 6.3V 1U	1	
	C7011	F1G0J1050007	C.CAPACITOR CH 6.3V 1U	1	
	C7014	F1H0J106A009	C.CAPACITOR CH 6.3V 10U	1	
	C7023	F1H0J106A009	C.CAPACITOR CH 6.3V 10U	1	
	C7104	F1G1A104A012	C.CAPACITOR CH 10V 0.1U	1	
	C7105	F1G1H221A551	C.CAPACITOR CH 50V 220P	1	
	C7106	F1G1H221A551	C.CAPACITOR CH 50V 220P	1	
	C7107	F1G0J1050007	C.CAPACITOR CH 6.3V 1U	1	

Model No. : DMC-FT4/TS4 Parts List

Safety	Ref. No.	Part No.	Part Name & Description	Q'ty	Remarks
	C7108	F1G0J1050007	C.CAPACITOR CH 6.3V 1U	1	
	C7109	F1G1H4710004	C.CAPACITOR CH 50V 470P	1	
	C7110	F1G1H4710004	C.CAPACITOR CH 50V 470P	1	
	C8003	F1G1H220A565	C.CAPACITOR CH 50V 22P	1	[PAVCX]
	C8004	F1G0J1050007	C.CAPACITOR CH 6.3V 1U	1	[PAVCX]
	C8005	F1J0J106A020	C.CAPACITOR CH 6.3V 10U	1	[PAVCX]
	C8006	F1K2E4730005	C.CAPACITOR 250V 0.047U	1	[PAVCX]
	C8010	F1G1H101A565	C.CAPACITOR CH 50V 100P	1	[PAVCX]
	C9001	F1H0J106A009	C.CAPACITOR CH 6.3V 10U	1	
	C9003	ECJ0EC1H100D	C.CAPACITOR CH 50V 10P	1	
	C9004	ECJ0EC1H100D	C.CAPACITOR CH 50V 10P	1	
	C9005	ECJ0EC1H100D	C.CAPACITOR CH 50V 10P	1	
	C9006	ECJ0EC1H100D	C.CAPACITOR CH 50V 10P	1	
	C9007	F1H0J106A009	C.CAPACITOR CH 6.3V 10U	1	
	C9008	F1G1A104A012	C.CAPACITOR CH 10V 0.1U	1	
	C9009	ECJ0EC1H100D	C.CAPACITOR CH 50V 10P	1	
	C9031	F1G1A104A012	C.CAPACITOR CH 10V 0.1U	1	
	C9101	F1G1H1020008	C.CAPACITOR CH 50V 1000P	1	
	C9102	F1G0J1050007	C.CAPACITOR CH 6.3V 1U	1	
	C9103	ECJ0EC1H100D	C.CAPACITOR CH 50V 10P	1	
	C9104	ECJ0EC1H120J	C.CAPACITOR CH 50V 12P	1	
	C9105	F1G0J1050007	C.CAPACITOR CH 6.3V 1U	1	
	C9106	F1G0J1050007	C.CAPACITOR CH 6.3V 1U	1	
	C9111	ECJ1VB1A105K	C.CAPACITOR CH 10V 1U	1	
	C9201	F1G1A104A012	C.CAPACITOR CH 10V 0.1U	1	
	C9202	F1G1A104A012	C.CAPACITOR CH 10V 0.1U	1	
	C9301	F1G1A104A012	C.CAPACITOR CH 10V 0.1U	1	
	C9601	F1H0J1060009	C.CAPACITOR CH 6.3V 10U	1	
	C9602	F1H0J1060009	C.CAPACITOR CH 6.3V 10U	1	
	C9603	F1H0J1060009	C.CAPACITOR CH 6.3V 10U	1	
	C9607	F1G1A104A012	C.CAPACITOR CH 10V 0.1U	1	
	C9608	F1G1A104A012	C.CAPACITOR CH 10V 0.1U	1	
	C9609	F1G1A104A012	C.CAPACITOR CH 10V 0.1U	1	
	C9616	F1G1A104A012	C.CAPACITOR CH 10V 0.1U	1	
	CX6001	F5A84103A020	CAPACITOR	1	
	D1010	B0JCMD000066	DIODE	1	E.S.D.
	D1040	B0JCFC000001	DIODE	1	E.S.D.
	D1041	B0JDCE000013	DIODE	1	E.S.D.
	D1042	B0BC018A0265	DIODE	1	E.S.D.
	D1050	B0JCFC000001	DIODE	1	E.S.D.
	D1070	B0JCFC000001	DIODE	1	E.S.D.
	D3001	B0ACCJ000052	DIODE	1	E.S.D.
	D6302	B3ABB0000150	DIODE	1	E.S.D.
	D8002	B0ECFR000003	DIODE	1	E.S.D. [PAVCX]
	D9119	B0ADDH000014	DIODE	1	E.S.D.
	D9601	B0JCDD000019	DIODE	1	E.S.D.
	D9901	B3AFB0000328	DIODE	1	E.S.D.
	ET2001	K4ZZ01000208	EARTH SPRING	1	
	ET2002	K4ZZ01000208	EARTH SPRING	1	
	ET2003	K4ZZ01000208	EARTH SPRING	1	
	ET2004	K4ZZ01000208	EARTH SPRING	1	
⚠	F2001	K5H1522A0018	FUSE 32V 1.5A	1	
⚠	F8001	ERBSE2R00U	FUSE 32V 2.0A	1	[PAVCX]
⚠	F8002	ERBSE1R25U	FUSE 32V 1.25A	1	[PAVCX]
	FL9601	J0ZZB0000146	FILTER	1	
	FL9602	J0ZZB0000146	FILTER	1	
	FL9603	F1H0J105A037	C.CAPACITOR CH 6.3V 1U	1	
	FP8001	K1MY18BA0370	CONNECTOR 18P	1	[PAVCX]
	FP9001	K1MY31BA0235	CONNECTOR 31P	1	
	FP9002	K1MY41BA0235	CONNECTOR 41P	1	
	FP9003	K1MY45BA0235	CONNECTOR 45P	1	
	FP9004	K1MY19BA0235	CONNECTOR 19P	1	

Model No. : DMC-FT4/TS4 Parts List

Safety	Ref. No.	Part No.	Part Name & Description	Q'ty	Remarks
	FP9005	K1MN04BA0162	CONNECTOR 4P	1	
	FP9006	K1MY18BA0370	CONNECTOR 18P	1	
	FP9007	K1MY39BA0235	CONNECTOR 39P	1	
	FP9008	K1MY15BA0235	CONNECTOR 15P	1	
	IC1001	C0DBAYY01047	IC	1	E.S.D.
	IC1090	C0DBAYY00946	IC	1	E.S.D.
	IC1110	C0DBGYY00821	IC	1	E.S.D.
	IC1210	C0DBGYY00851	IC	1	E.S.D.
	IC1620	C0CBCYY00056	IC	1	E.S.D.
	IC3001	C1AB00003533	IC	1	E.S.D.
	IC3002	C0DBGYY00798	IC	1	E.S.D.
	IC3003	C0DBGYY00777	IC	1	E.S.D.
	IC6001	MN89513	IC	1	E.S.D.
	IC6002	RS10320	IC	1	E.S.D.
	IC6301	L2ES00000022	IC	1	E.S.D.
	IC6302	L2ES00000021	IC	1	E.S.D.
	IC7103	C0ABHA000070	IC	1	E.S.D.
	IC8001	C0ZBZ0001817	IC	1	E.S.D. [PAVCX]
	IC9001	C0JBAU000053	IC	1	E.S.D.
	IC9101	C1AB00003449	IC	1	E.S.D.
	IC9201	VUEALLPT048	IC	1	E.S.D.
	IC9202	VUEALLPT047	IC	1	E.S.D.
	IC9301	------	IC	1	E.S.D. (NOT SUPPLIED) REPLACE WITH VEP50082A.
	IC9601	MN864712P-EB	IC	1	E.S.D.
	JK2001	K1FB108E0008	JACK, AV/USB	1	
	JK2004	K1FY119EA020	JACK	1	
	L1010	G1C4R7MA0428	CHIP INDUCTOR 4.7UH	1	
	L1020	G1C4R7MA0428	CHIP INDUCTOR 4.7UH	1	
	L1030	G1C4R7MA0328	CHIP INDUCTOR 4.7UH	1	
	L1040	G1C100MA0393	CHIP INDUCTOR 10UH	1	
	L1050	ELLVGG4R7NC	CHIP INDUCTOR 4.7UH	1	
	L1060	G1C4R7MA0328	CHIP INDUCTOR 4.7UH	1	
	L1070	G1C100MA0428	CHIP INDUCTOR 10UH	1	
	L1090	G1C4R7MA0388	CHIP INDUCTOR 4.7UH	1	
	L2001	J0ZZB0000142	FILTER	1	
	L3002	G1C2R2MA0211	CHIP INDUCTOR 2.2UH	1	
	L3003	G1C100MA0410	CHIP INDUCTOR 10UH	1	
	L3004	G1C100KA0115	CHIP INDUCTOR 10UH	1	
	L7001	G1C100MA0410	CHIP INDUCTOR 10UH	1	
	L7101	G1C100MA0410	CHIP INDUCTOR 10UH	1	
	L8001	G5F1A0000026	CHIP INDUCTOR	1	[PAVCX]
	L9601	G1C100KA0138	CHIP INDUCTOR 10UH	1	
	L9602	G1C100KA0138	CHIP INDUCTOR 10UH	1	
	LB1001	J0JHC0000048	FILTER	1	
	LB2001	J0JCC0000415	FILTER	1	
	LB2002	J0JCC0000415	FILTER	1	
	LB2003	J0JCC0000415	FILTER	1	
	LB2004	J0JCC0000415	FILTER	1	
	LB6001	J0JCC0000317	FILTER	1	
	LB6003	J0JCC0000412	FILTER	1	
	LB6004	J0JCC0000412	FILTER	1	
	LB6040	J0JCC0000412	FILTER	1	
	LB6084	J0JDC0000105	FILTER	1	
	LB9000	J0JDC0000099	FILTER	1	
	LB9001	J0JDC0000099	FILTER	1	
	LB9002	J0JDC0000099	FILTER	1	
	LB9003	J0JDC0000099	FILTER	1	
	LB9601	J0JYC0000061	FILTER	1	
	LB9602	J0JYC0000061	FILTER	1	
	LB9603	J0JYC0000061	FILTER	1	
	LB9604	J0JYC0000061	FILTER	1	

Model No. : DMC-FT4/TS4 Parts List

Safety	Ref. No.	Part No.	Part Name & Description	Q'ty	Remarks
	LB9605	J0JCC0000412	FILTER	1	
	M9901	L0CBAA000014	MICROPHONE UNITS	1	
	P8002	K4ZZ04000060	CONNECTOR 4P	1	[PAVCX]
	P9007	K1NA09E00098	SD CARD CONNECTOR	1	
	Q1620	B1CFJC000009	TRANSISTOR	1	E.S.D.
	Q8001	B1JBLP000038	TRANSISTOR	1	E.S.D. [PAVCX]
	Q9001	B1HFCFA00035	TRANSISTOR-RESISTOR	1	E.S.D.
	QR1001	B1GKCFGN0003	TRANSISTOR-RESISTOR	1	E.S.D.
	QR1620	B1GBCFJN0041	TRANSISTOR-RESISTOR	1	E.S.D.
	QR6001	B1GBCFNL0020	TRANSISTOR-RESISTOR	1	E.S.D.
	R1002	ERJ2RHD183	M.RESISTOR CH 1/16W 18K	1	
	R1003	ERJ2RHD223	M.RESISTOR CH 1/16W 22K	1	
	R1008	D0GB1R0JA057	M.RESISTOR CH 1/10W 1	1	
	R1041	ERJ2RKD204	M.RESISTOR CH 1/16W 200K	1	
	R1042	ERJ2RKD334	M.RESISTOR CH 1/16W 330K	1	
	R1043	ERJ2RHD822X	M.RESISTOR CH 1/16W 8.2K	1	
	R1044	ERJ2RHD104	M.RESISTOR CH 1/16W 100K	1	
	R1045	ERJ2RHD103	M.RESISTOR CH 1/16W 10K	1	
	R1046	ERJ2RKD334	M.RESISTOR CH 1/16W 330K	1	
	R1051	ERJ2RKD124	M.RESISTOR CH 1/16W 120K	1	
	R1052	ERJ2RHD303	M.RESISTOR CH 1/16W 30K	1	
	R1061	ERJ2RHD512	M.RESISTOR CH 1/16W 5.1K	1	
	R1062	ERJ2RHD162X	M.RESISTOR CH 1/16W 1.6K	1	
	R1071	ERJ2RHD222	M.RESISTOR CH 1/16W 2.2K	1	
	R1072	ERJ2RHD753	M.RESISTOR CH 1/16W 75K	1	
	R1073	ERJ2RHD153X	M.RESISTOR CH 1/16W 15K	1	
	R1122	ERJ2GEJ473	M.RESISTOR CH 1/16W 47K	1	
	R1622	ERJ2GEJ104	M.RESISTOR CH 1/10W 100K	1	
	R2001	ERJ2GEJ750	M.RESISTOR CH 1/10W 75	1	
	R2002	ERJ2GEJ561	M.RESISTOR CH 1/16W 560	1	
	R2003	ERJ2GEJ102X	M.RESISTOR CH 1/16W 1K	1	
	R2005	ERJ2GEJ102X	M.RESISTOR CH 1/16W 1K	1	
	R3007	D0YAR0000007	M.RESISTOR CH 1/10W 0	1	
	R3009	ERJ2GEJ100	M.RESISTOR CH 1/10W 10	1	
	R3030	ERJ2GEJ103	M.RESISTOR CH 1/10W 10K	1	
	R4001	ERJ2GEJ224	M.RESISTOR CH 1/10W 220K	1	
	R5012	D0YAR0000007	M.RESISTOR CH 1/10W 0	1	
	R5013	ERJ2GEJ222	M.RESISTOR CH 1/10W 2.2K	1	
	R6004	ERJ2GEJ103	M.RESISTOR CH 1/10W 10K	1	
	R6006	ERJ2RKF5901	M.RESISTOR CH 1/16W 5.9K	1	
	R6008	ERJ2GEJ105	M.RESISTOR CH 1/10W 1M	1	
	R6009	ERJ2GEJ821	M.RESISTOR CH 1/10W 820	1	
	R6010	ERJ2GEJ103	M.RESISTOR CH 1/10W 10K	1	
	R6011	ERJ2GEJ101	M.RESISTOR CH 1/10W 100	1	
	R6012	ERJ2GEJ103	M.RESISTOR CH 1/10W 10K	1	
	R6014	ERJ2RKD330	M.RESISTOR CH 1/16W 33	1	
	R6018	ERJ2RKF1183	M.RESISTOR CH 1/16W 118K	1	
	R6019	ERJ2RHD222	M.RESISTOR CH 1/16W 2.2K	1	
	R6020	ERJ2RHD122	M.RESISTOR CH 1/16W 1.2K	1	
	R6021	ERJ2GEJ473	M.RESISTOR CH 1/16W 47K	1	
	R6028	ERJ2RHD561	M.RESISTOR CH 1/16W 560	1	
	R6030	ERJ2GEJ104	M.RESISTOR CH 1/10W 100K	1	
	R6033	ERJ2GEJ220	M.RESISTOR CH 1/16W 22	1	
	R6034	ERJ2GEJ220	M.RESISTOR CH 1/16W 22	1	
	R6037	ERJ2GEJ102X	M.RESISTOR CH 1/16W 1K	1	
	R6039	ERJ2GEJ102X	M.RESISTOR CH 1/16W 1K	1	
	R6047	D0YAR0000007	M.RESISTOR CH 1/10W 0	1	EG,EP,EF,EB
	R6050	ERJ2GEJ103	M.RESISTOR CH 1/10W 10K	1	
	R6053	ERJ2GEJ101	M.RESISTOR CH 1/10W 100	1	
	R6057	ERJ2GEJ101	M.RESISTOR CH 1/10W 100	1	
	R6058	ERJ2RKF1000	M.RESISTOR CH 1/16W 1K	1	
	R6059	ERJ2RKF1000	M.RESISTOR CH 1/16W 1K	1	

Model No. : DMC-FT4/TS4 Parts List

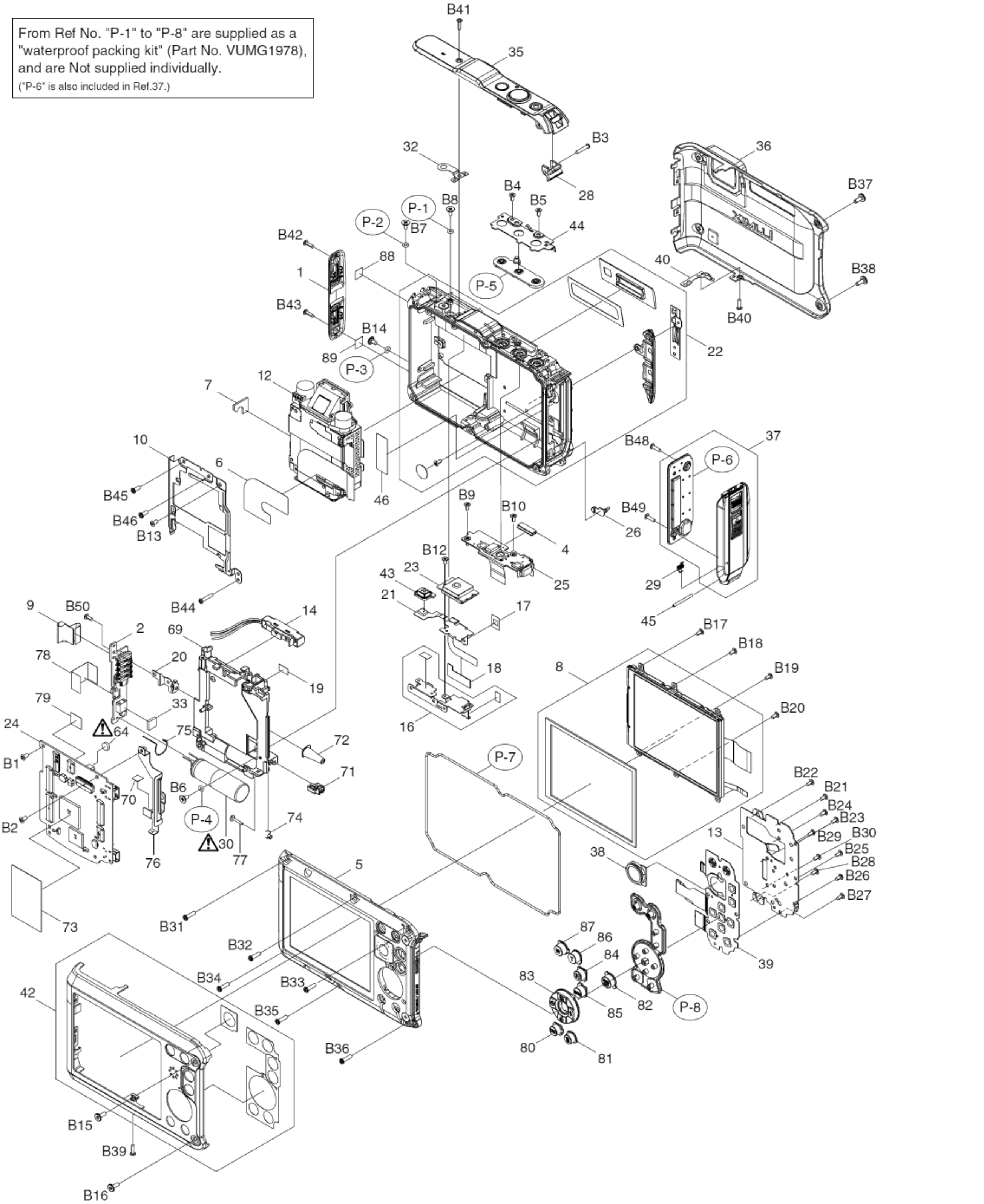
Safety	Ref. No.	Part No.	Part Name & Description	Q'ty	Remarks
	R6060	ERJ2RKF1000	M.RESISTOR CH 1/16W 1K	1	
	R6061	ERJ2RKF1000	M.RESISTOR CH 1/16W 1K	1	
	R6062	ERJ2RKF1000	M.RESISTOR CH 1/16W 1K	1	
	R6063	ERJ2RKF1000	M.RESISTOR CH 1/16W 1K	1	
	R6071	ERJ2GEJ102X	M.RESISTOR CH 1/16W 1K	1	
	R6079	ERJ2GEJ161	M.RESISTOR CH 1/10W 160	1	
	R6085	ERJ2GEJ103	M.RESISTOR CH 1/10W 10K	1	
	R6401	ERJ2GEJ123	M.RESISTOR CH 1/16W 12K	1	
	R6402	ERJ2GEJ223	M.RESISTOR CH 1/16W 22K	1	
	R6410	ERJ2GEJ680	M.RESISTOR CH 1/10W 68	1	
	R6411	ERJ2GEJ680	M.RESISTOR CH 1/10W 68	1	
	R6412	ERJ2GEJ680	M.RESISTOR CH 1/10W 68	1	
	R6413	ERJ2GEJ680	M.RESISTOR CH 1/10W 68	1	
	R6414	ERJ2GEJ102X	M.RESISTOR CH 1/16W 1K	1	
	R6420	D0YAR0000007	M.RESISTOR CH 1/10W 0	1	
	R7002	ERJ2RKD680	M.RESISTOR CH 1/16W 68	1	
	R7007	ERJ2RKD680	M.RESISTOR CH 1/16W 68	1	
	R7009	D0HA1R0ZA005	M.RESISTOR CH 1/10W 1	1	
	R7021	ERJ2RHD822X	M.RESISTOR CH 1/16W 8.2K	1	
	R7101	ERJ2RKD564	M.RESISTOR CH 1/16W 560K	1	
	R7102	ERJ2RKD564	M.RESISTOR CH 1/16W 560K	1	
	R7103	ERJ2RHD472X	M.RESISTOR CH 1/16W 4.7K	1	
	R7104	ERJ2RHD472X	M.RESISTOR CH 1/16W 4.7K	1	
	R7105	ERJ2RHD823	M.RESISTOR CH 1/16W 82K	1	
	R7106	ERJ2RHD823	M.RESISTOR CH 1/16W 82K	1	
	R7109	ERJ2GEJ103	M.RESISTOR CH 1/10W 10K	1	
	R7110	ERJ2GEJ103	M.RESISTOR CH 1/10W 10K	1	
	R7111	D0YAR0000007	M.RESISTOR CH 1/10W 0	1	
	R7112	D0YAR0000007	M.RESISTOR CH 1/10W 0	1	
	R8001	D0GB820JA065	M.RESISTOR CH 1/10W 100	1	[PAVCX]
	R8002	ERJ6GEYJ514V	M.RESISTOR CH 1/8W 510K	1	[PAVCX]
	R8003	ERJ6GEYJ514V	M.RESISTOR CH 1/8W 510K	1	[PAVCX]
	R8004	D1BD4703A119	CHIP RESISTOR	1	[PAVCX]
	R8006	ERJ2RHD1621X	M.RESISTOR CH 1/16W 1620	1	[PAVCX]
	R8008	ERJ3GEYJ104V	M.RESISTOR CH 1/10W 100K	1	[PAVCX]
	R8009	ERJ2GEJ473X	M.RESISTOR CH 1/16W 47K	1	[PAVCX]
	R8010	ERJ3GEY0R00V	M.RESISTOR CH 1/10W 0	1	[PAVCX]
	R9001	ERJ2GEJ223	M.RESISTOR CH 1/16W 22K	1	
	R9003	ERJ2GEJ221	M.RESISTOR CH 1/16W 220	1	
	R9004	ERJ2GEJ221	M.RESISTOR CH 1/16W 220	1	
	R9005	ERJ2GED273X	M.RESISTOR CH 1/10W 27K	1	
	R9006	ERJ2GED273X	M.RESISTOR CH 1/10W 27K	1	
	R9007	ERJ2RHD223	M.RESISTOR CH 1/16W 22K	1	
	R9008	ERJ2RHD103	M.RESISTOR CH 1/16W 10K	1	
	R9012	ERJ2GEJ302	M.RESISTOR CH 1/16W 3K	1	
	R9014	ERJ3GEYJ200	M.RESISTOR CH 1/10W 20	1	
	R9030	ERJ2GEJ223	M.RESISTOR CH 1/16W 22K	1	
	R9035	ERJ2GEJ151	M.RESISTOR CH 1/10W 150	1	
	R9101	ERJ2GEJ102X	M.RESISTOR CH 1/16W 1K	1	
	R9102	ERJ2GEJ102X	M.RESISTOR CH 1/16W 1K	1	
	R9103	ERJ2GEJ102X	M.RESISTOR CH 1/16W 1K	1	
	R9106	ERJ2GEJ824	M.RESISTOR CH 1/16W 820K	1	
	R9107	ERJ2GEJ334	M.RESISTOR CH 1/16W 330K	1	
	R9108	ERJ2GEJ512X	M.RESISTOR CH 1/16W 5.1K	1	
	R9109	ERJ2GEJ331	M.RESISTOR CH 1/16W 330	1	
	R9120	ERJ2GEJ102X	M.RESISTOR CH 1/16W 1K	1	
	R9607	ERJ2GEJ472	M.RESISTOR CH 1/10W 4.7K	1	
	R9608	ERJ2GEJ472	M.RESISTOR CH 1/10W 4.7K	1	
	R9609	ERJ2GEJ472	M.RESISTOR CH 1/10W 4.7K	1	
	R9610	ERJ2GEJ103	M.RESISTOR CH 1/10W 10K	1	
	R9617	ERJ2GEJ471	M.RESISTOR CH 1/10W 470	1	
	R9618	ERJ2GED273X	M.RESISTOR CH 1/10W 27K	1	

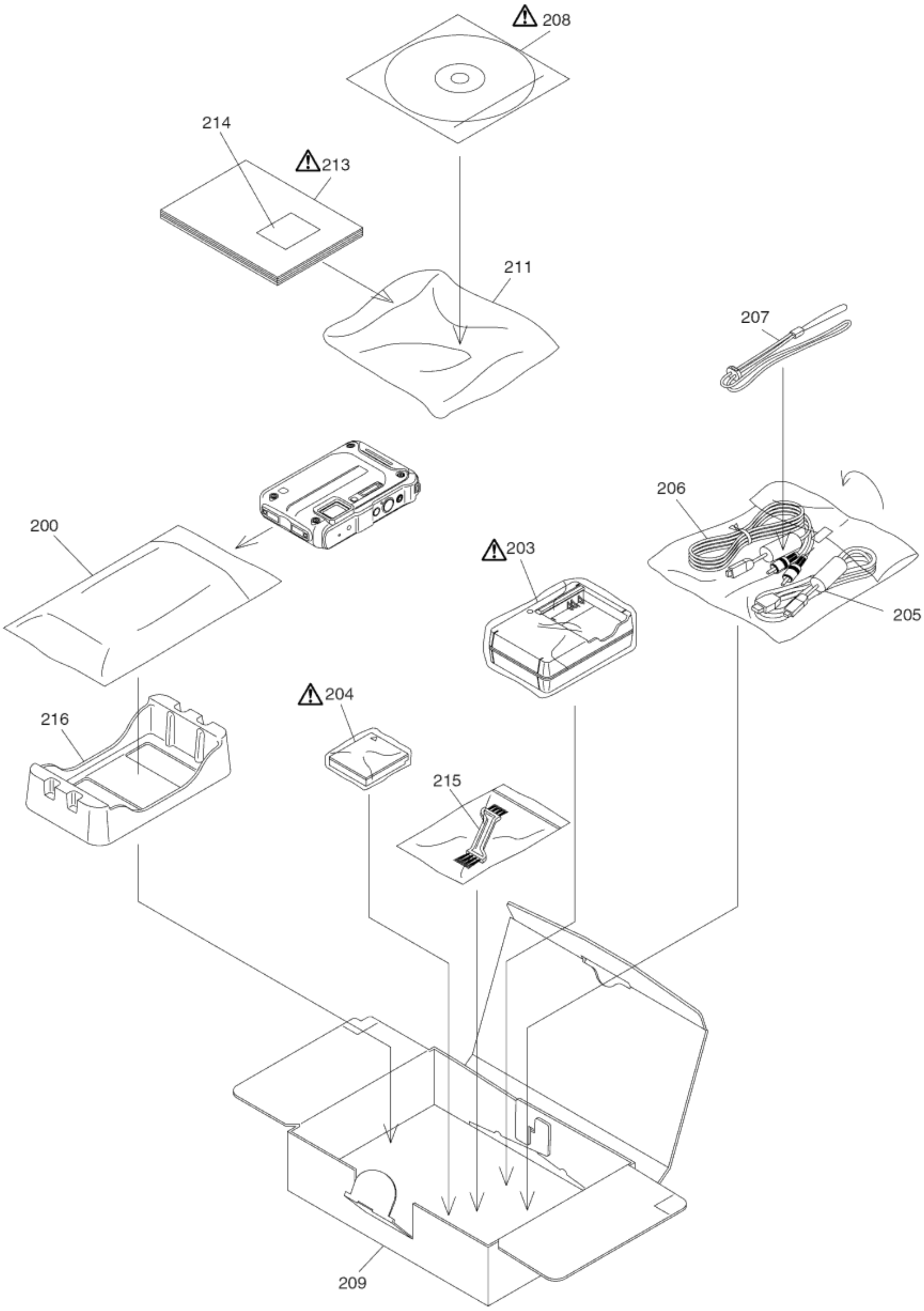
Model No. : DMC-FT4/TS4 Parts List

Safety	Ref. No.	Part No.	Part Name & Description	Q'ty	Remarks
	R9619	ERJ2GEJ202	M.RESISTOR CH 1/10W 2K	1	
	R9620	ERJ2GEJ202	M.RESISTOR CH 1/10W 2K	1	
	R9621	ERJ2RHD682X	M.RESISTOR CH 1/10W 6.8K	1	
	RX6001	EXBN8V103J	RESISTOR ARRAY 1/32W 10K	1	
	RX6002	EXBN8V101JX	RESISTOR ARRAY 1/32W 100	1	
	RX6003	EXBN8V101JX	RESISTOR ARRAY 1/32W 100	1	
	RX9001	D1H84734A024	RESISTOR ARRAY	1	
	S6301	K0F212A00003	SWITCH	1	
	S6302	K0F111A00541	SWITCH	1	
	S6303	K0F111A00541	SWITCH	1	
	S6402	K0F111A00541	SWITCH	1	
	S6403	K0F111A00541	SWITCH	1	
	S6404	K0F111A00541	SWITCH	1	
	S6405	K0F111A00541	SWITCH	1	
	S6406	K0F111A00541	SWITCH	1	
	S6407	K0F111A00541	SWITCH	1	
	S6408	K0F111A00541	SWITCH	1	
	S6409	K0F111A00541	SWITCH	1	
	S6410	K0F111A00541	SWITCH	1	
	T8001	G5D1A0000080	TRANSFORMER	1	[PAVCX]
	VA9901	D4ED18R00004	VARISTOR	1	
	X6001	H0J240500026	CRYSTAL OSCILLATOR	1	
	X9101	H0J327200225	CRYSTAL OSCILLATOR	1	
	ZB9101	K3ZZ00200042	BATTERY HOLDER	1	

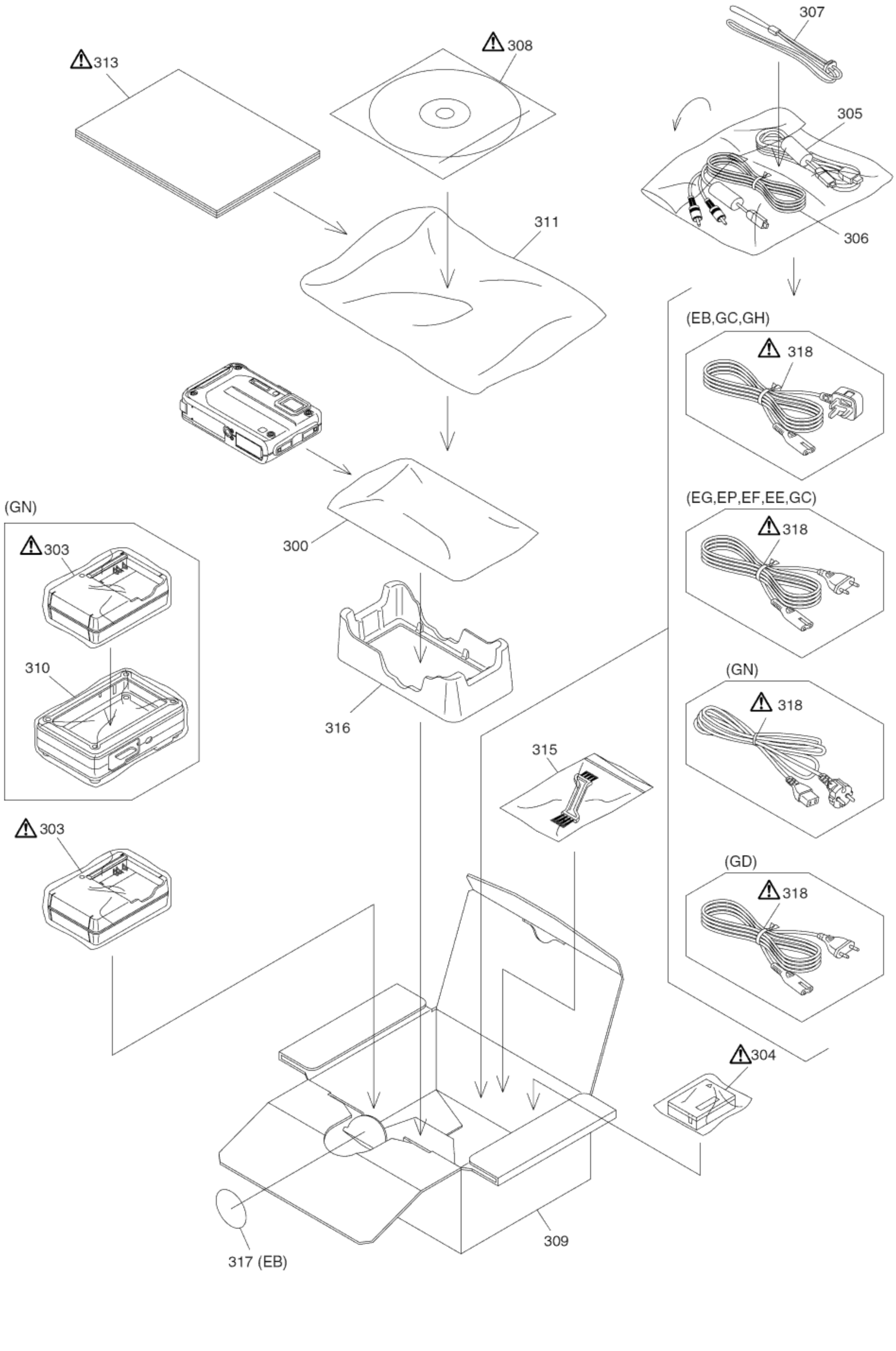
Model No. : DMC-FT4/TS4 Frame and Casing Section

From Ref No. "P-1" to "P-8" are supplied as a "waterproof packing kit" (Part No. VUMG1978), and are Not supplied individually.
("P-6" is also included in Ref.37.)




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Model No. : DMC-FT4/TS4   Packing Parts and Accessories Section (2)



Model No. : DMC-FT4/TS4 Parts List

Safety	Ref. No.	Part No.	Part Name & Description	Q'ty	Remarks
	1	VKM8987	SIDE ORNAMENT R	1	
	2	VEP58155A	FLASH CON P.C.B.	1	(RTL) E.S.D. [PAVCX]
	4	VGQ0W23	TOP FPC SHEET	1	
	5	VYK4L63	REAR CASE(1) U	1	
	6	VGQ0U27	DPR SHEET	1	
	7	VGQ0W11	LENS CUSHION	1	
	8	VYQ7177	LCD UNIT	1	
	9	VWJ2256	FLASH MAIN FPC	1	
	10	VMP9914	LENS PLATE	1	
	12	VXW1212	LENS UNIT (W/CCD)	1	
	13	VMP9915	REAR FPC PLATE	1	
	14	VEK0R44	FLASH U	1	[PAVCX]
	16	VYQ6761	GPS PLATE UNIT	1	
	17	VGQ0V82	LED SHEET	1	
	18	VGQ0V48	DPR SHEET	1	
	19	VGQ0U13	DF TAPE	1	[PAVCX]
	20	VMC2167	FL EARTH PLATE	1	[PAVCX]
	21	VEP54023A	MIC G FPC UNIT	1	(RTL) E.S.D.
	22	VYK5T41	FRONT CASE(1) U	1	
	23	N5HZZ0000090	GPS UNIT	1	
	24	VEP56129D	MAIN P.C.B.	1	(RTL) E.S.D. EG,EP,EF,EB
	24	VEP56129C	MAIN P.C.B.	1	(RTL) E.S.D. EE,GC,GN,P,PC,PU,GH,GD
	25	VEP50082A	TOP FPC UNIT	1	E.S.D.
	26	VGQ0T85	FC PIECE	1	
	28	VKH0465	STRAP HOLDER	1	
	29	VMB4469	BATT DOOR SPRING	1	
⚠	30	F2A2F8400002	FLASH CHRG CAPA. U	1	(C8001) [PAVCX]
	32	VMC2169	TOP EARTH PLATE	1	
	33	VGQ0W29	STB CUSHION	1	[PAVCX]
	35	VYK5P21	TOP ORNAMENT U	1	(DMC-FT4) [PAVCX]
	35	VYK5P22	TOP ORNAMENT U	1	(DMC-TS4) [PAVCX]
	36	VYK5P36	FRONT ALMI U	1	EG-S,EP-S,EB-S,EE-S,GC-S,GN-S,PU-S,GH-S
	36	VYK5P39	FRONT ALMI U	1	EG-K,EP-K,EF-K,EB-K,GC-K,GN-K,PC-K,PU-K
	36	VYK5P37	FRONT ALMI U	1	EG-A,EP-A,EB-A,GC-A,GN-A,PC-A,PU-A,GH-A,GD-A
	36	VYK5P38	FRONT ALMI U	1	EG-D,EP-D,EF-D,EB-D,EE-D,GC-D,GN-D,PC-D,PU-D,GH-D,GD-D
	36	VYK5P40	FRONT ALMI U	1	P-S
	36	VYK5P43	FRONT ALMI U	1	P-K
	36	VYK5P41	FRONT ALMI U	1	P-A
	36	VYK5P42	FRONT ALMI U	1	P-D
	37	VYK4L71	BATTERY DOOR U	1	[PAVCX]
	38	L0AA01A00032	SPEAKER	1	(SP6401)
	39	VEP50083A	REAR OPE FPC UNIT	1	(RTL) E.S.D.
	40	VMC2170	BOTTOM EARTH PLATE	1	
	42	VYK5P08	REAR ALMI CASE U	1	(-S) [PAVCX]
	42	VYK5P11	REAR ALMI CASE U	1	(-K) [PAVCX]
	42	VYK5P09	REAR ALMI CASE U	1	(-A) [PAVCX]
	42	VYK5P10	REAR ALMI CASE U	1	(-D) [PAVCX]
	43	VMG1981	MIC DAMPER	1	
	44	VMP9919	TOP BUTTON PLATE	1	
	45	VMS8171	DOOR SHAFT	1	
	46	VQL2F13	BATTERY LABEL	1	
⚠	64	ML-421S/ZTK	BUTTON BATTERY	1	[ENERGY] (B6402)
	69	VGQ0S49	BATTERY FRAME	1	[PAVCX]
	70	VGQ9405	WATER LABEL	1	[PAVCX]
	71	VGU0H92	BATT LOCK KNOB	1	[PAVCX]
	72	VMB4340	BATT OUT SPRING	1	[PAVCX]
	73	VGQ0V49	DPR SHEET	1	
	74	VMB4465	BATT LOCK SPRING	1	[PAVCX]
	75	VMB4466	EARTH SPRING	1	[PAVCX]
	76	VMP9916	BATT LOCK PLATE	1	[PAVCX]

Model No. : DMC-FT4/TS4 Parts List

Safety	Ref. No.	Part No.	Part Name & Description	Q'ty	Remarks
	77	VMS8149	BATT LOCK SHAFT	1	[PAVCX]
	78	VGQ0S50	BARRIER TAPE	1	[PAVCX]
	79	VGQ0V50	DPR SHEET	1	
	80	VGU0H84	REAR BUTTON DISPLAY	1	[PAVCX]
	81	VGU0H85	REAR BUTTON Q.MENU	1	[PAVCX]
	82	VGU0H86	REAR BUTTON MENU SET	1	[PAVCX]
	83	VGU0H87	REAR BUTTON CURSOR	1	[PAVCX]
	84	VGU0H88	REAR BUTTON PLAY	1	[PAVCX]
	85	VGU0H89	REAR BUTTON MODE	1	[PAVCX]
	86	VGU0H90	ZOOM BUTTON T	1	[PAVCX]
	87	VGU0H91	ZOOM BUTTON W	1	[PAVCX]
	88	VGQ0W16	SIDE EARTH TAPE	1	
	89	VGQ0W16	SIDE EARTH TAPE	1	
	200	VPF1386	CAMERA BAG	1	P,PC
⚠	203	DE-A59BC	BATTERY CHARGER	1	P,PC
⚠	204	-----	BATTERY PACK	1	P,PC (NOT SUPPLIED)
	205	K1HY08YY0017	USB CABLE	1	P,PC
	206	K1HY08YY0018	AV CABLE	1	P,PC
	207	VFC4393	HAND STRAP	1	P,PC
⚠	208	VFF0990	CD-ROM(SOFT/INSTRUCTION BOOK)	1	P,PC See "Notes"
	209	VPK5316	PACKING CASE	1	P-S
	209	VPK5319	PACKING CASE	1	P-K,PC-K
	209	VPK5323	PACKING CASE	1	P-A,PC-A
	209	VPK5327	PACKING CASE	1	P-D,PC-D
	211	VPF1230	POLYETHYLENE BAG	1	P,PC
⚠	213	VQT4D89	BASIC O/I (ENGLISH/SPANISH)	1	P
⚠	213	VQT4D90	BASIC O/I (ENGLISH/CANADIAN FRENCH)	1	PC
	214	VQL2C67	OPERATING LABEL	1	PC
	215	VFC4588T	CLEANING BRUSH	1	P,PC
	216	VPN7190	CUSHION	1	P,PC
	300	VPF1386	CAMERA BAG	1	EXCEPT P,PC
⚠	303	DE-A60AB	BATTERY CHARGER	1	EG,EP,EF,EB,GN
⚠	303	DE-A60BE	BATTERY CHARGER	1	EE,GC,GH,GD
⚠	303	DE-A59BC	BATTERY CHARGER	1	PU
⚠	304	-----	BATTERY PACK	1	EXCEPT P,PC (NOT SUPPLIED)
	305	K1HY08YY0017	USB CABLE	1	EXCEPT P,PC
	306	K1HY08YY0018	AV CABLE	1	EXCEPT P,PC
	307	VFC4393	HAND STRAP	1	EXCEPT P,PC
⚠	308	VFF0991	CD-ROM(SOFT/INSTRUCTION BOOK)	1	EG See "Notes"
⚠	308	VFF0992	CD-ROM(SOFT/INSTRUCTION BOOK)	1	EP,EF,EB See "Notes"
⚠	308	VFF0993	CD-ROM(SOFT/INSTRUCTION BOOK)	1	EE See "Notes"
⚠	308	VFF0994	CD-ROM(SOFT/INSTRUCTION BOOK)	1	GC,GN,GH See "Notes"
⚠	308	VFF0995	CD-ROM(SOFT/INSTRUCTION BOOK)	1	GD See "Notes"
⚠	308	VFF0990	CD-ROM(SOFT/INSTRUCTION BOOK)	1	PU See "Notes"
	309	VPK5317	PACKING CASE	1	EG-S,EP-S,EB-S,EE-S,GC-S,GN-S
	309	VPK5320	PACKING CASE	1	EG-K,EP-K,EF-K,EB-K,GC-K,GN-K
	309	VPK5324	PACKING CASE	1	EG-A,EP-A,EB-A,GC-A,GN-A
	309	VPK5328	PACKING CASE	1	EG-D,EP-D,EF-D,EB-D,EE-D,GC-D,GN-D
	309	VPK5318	PACKING CASE	1	PU-S,GH-S
	309	VPK5321	PACKING CASE	1	PU-K
	309	VPK5325	PACKING CASE	1	PU-A,GH-A,GD-A
	309	VPK5329	PACKING CASE	1	PU-D,GH-D,GD-D
	310	VMG1988	SILICONE JACKET	1	GN
	311	VPF1230	POLYETHYLENE BAG	1	EXCEPT P,PC
⚠	313	VQT4D92	BASIC O/I (GERMAN/FRENCH)	1	EG
⚠	313	VQT4D93	BASIC O/I (ITALIAN/DUTCH)	1	EG
⚠	313	VQT4D94	BASIC O/I (SPANISH/PORTUGUESE)	1	EG
⚠	313	VQT4D95	BASIC O/I (TURKISH)	1	EG
⚠	313	VQT4D96	BASIC O/I (SWEDISH/DANISH)	1	EP
⚠	313	VQT4D97	BASIC O/I (POLISH/CZECH)	1	EP
⚠	313	VQT4D98	BASIC O/I (HUNGARIAN/FINNISH)	1	EP
⚠	313	VQT4D99	BASIC O/I (FRENCH)	1	EF

Model No. : DMC-FT4/TS4 Parts List

Safety	Ref. No.	Part No.	Part Name & Description	Q'ty	Remarks
⚠	313	VQT4E00	BASIC O/I (ENGLISH)	1	EB
⚠	313	VQT4E01	BASIC O/I (RUSSIAN/UKRAINIAN)	1	EE
⚠	313	VQT4E02	BASIC O/I (ENGLISH/CHINESE(TRADITIONAL))	1	GC,GH
⚠	313	VQT4E03	BASIC O/I (ARABIC/PERSIAN)	1	GC
⚠	313	VQT4E04	BASIC O/I (VIETNAMESE)	1	GC
⚠	313	VQT4E06	BASIC O/I (ENGLISH)	1	GN
⚠	313	VQT4D91	BASIC O/I (SPANISH/PORTUGUESE)	1	PU
⚠	313	VQT4E07	BASIC O/I (KOREAN)	1	GD
	315	VFC4588T	CLEANING BRUSH	1	EXCEPT P,PC
	316	VPN7190	CUSHION	1	EXCEPT P,PC
	317	VQL1S66	LABEL	1	EB
⚠	318	K2CQ29A00002	AC CORD	1	EG,EP,EF,EE,GC
⚠	318	K2CT39A00002	AC CORD	1	EB,GC,GH
⚠	318	K2CJ29A00002	AC CORD	1	GN
⚠	318	K2CR29A00001	AC CORD	1	GD
	B1	VHD1678	SCREW	1	
	B2	VHD1678	SCREW	1	
	B3	VHD2336	SCREW	1	
	B4	VHD2212	SCREW	1	
	B5	VHD2212	SCREW	1	
	B6	VHD2074	SCREW	1	
	B7	VHD2074	SCREW	1	
	B8	VHD2074	SCREW	1	
	B9	VHD1759	SCREW	1	
	B10	VHD1759	SCREW	1	
	B12	VHD2037	SCREW	1	
	B13	VHD1678	SCREW	1	
	B14	VHD2074	SCREW	1	
	B15	VHD2289	SCREW	1	
	B16	VHD2289	SCREW	1	
	B17	VHD1909	SCREW	1	
	B18	VHD1909	SCREW	1	
	B19	VHD1909	SCREW	1	
	B20	VHD1909	SCREW	1	
	B21	VHD1909	SCREW	1	
	B22	VHD1909	SCREW	1	
	B23	VHD1909	SCREW	1	
	B24	VHD1909	SCREW	1	
	B25	VHD1909	SCREW	1	
	B26	VHD1909	SCREW	1	
	B27	VHD1909	SCREW	1	
	B28	VHD1909	SCREW	1	
	B29	VHD1909	SCREW	1	
	B30	VHD1909	SCREW	1	
	B31	VHD2222	SCREW	1	
	B32	VHD2222	SCREW	1	
	B33	VHD2222	SCREW	1	
	B34	VHD2222	SCREW	1	
	B35	VHD2222	SCREW	1	
	B36	VHD2222	SCREW	1	
	B37	VHD2289	SCREW	1	
	B38	VHD2289	SCREW	1	
	B39	VHD2318	SCREW	1	
	B40	VHD2318	SCREW	1	
	B41	VHD2318	SCREW	1	
	B42	VHD2318	SCREW	1	
	B43	VHD2318	SCREW	1	
	B44	VHD2336	SCREW	1	
	B45	XQN16+BJ4FN	SCREW	1	
	B46	XQN16+BJ4FN	SCREW	1	
	B48	VHD2322	SCREW	1	[PAVCX]
	B49	VHD2322	SCREW	1	[PAVCX]

Model No. : DMC-FT4/TS4 Parts List

Safety	Ref. No.	Part No.	Part Name & Description	Q'ty	Remarks
	B50	VHD1759	SCREW	1	[PAVCX]
	P	VUMG1978	WATERPROOF PACKING KIT	1	(Including in "P-1 to P-8")
	P-1	-----	O-RING	1	(Included in "VUMG1978")
	P-2	-----	O-RING	1	(Included in "VUMG1978")
	P-3	-----	O-RING	1	(Included in "VUMG1978")
	P-4	-----	O-RING	1	(Included in "VUMG1978")
	P-5	-----	TOP BUTTON PACKING	1	(Included in "VUMG1978")
	P-6	-----	BATT DOOR PACKING	1	(Included in "VUMG1978")
	P-7	-----	CASE O-RING	1	(Included in "VUMG1978")
	P-8	-----	REAR BUTTON PACKING	1	(Included in "VUMG1978")